King Fahd University of Petroleum & Minerals

Computer Engineering Department

Self-Assessment Report

Submitted to

Deanship of Academic Development

King Fahd University of Petroleum & Minerals, Dhahran

COE PROGRAM REPRESENTATIVE TEAM (PRT)

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Introduction

The Computer Engineering (COE) Department at King Fahd University of Petroleum & Minerals was established in 1984 as a constituent of the College of Computer Sciences and Engineering (CCSE). Since then the COE has witnessed an impressive growth in all aspects. For example, in the COE department the first batch of BS students registered in 1987, consisted of 17 students. In 2002, the total number of BS students in the department exceeded 750.

Computer engineering is a discipline of much interest and demand exists both in Saudi Arabia and elsewhere. Currently, there is a critical shortage of computer professionals who can design and implement computer systems and networks. The Kingdom of Saudi Arabia has focused on computer technology and its utilization as one of the fundamental tools to modernize its industry to cope up with advances in modern technology. Employment opportunities for qualified computer engineers are tremendous.

The Computer Engineering Department provides a program that develops the necessary skills and competence required to design and implement computer systems and networks. The computer engineering curriculum emphasizes the areas of digital system architecture and design, microprocessors, integrated circuit technology, computer communication, and computer networks. In addition, sufficient emphasis is given to the study of computer science to provide a coherent view of computer systems and an understanding of the interdependencies of hardware and software components and their interfaces and tradeoffs.

This report contains eight sections. The first section outlines COE program, mission and objectives. The second section provides information about the curriculum design and its organization. Section three lists the laboratories and their related information followed by student support and guidance. Sections four through eight cover student support, process control, faculty, and institutional facilities & support.

Section 1: Program Mission, Objectives, and Outcomes

1.1 Introduction

The mission of the COE Department is to serve the students of KFUPM and the country by graduating qualified, world-scale competitive computer engineers abreast of state-of-the-art in computer technology who can serve as the technically qualified workforce needed by the Kingdom in the industry, academia, and government.

1.2 The COE Undergraduate Program Mission Statement

The undergraduate program in Computer Engineering at KFUPM is designed to prepare students for technical positions in the industry as well as for graduate studies in its related disciplines. Because of the rapid evolution in computer technologies, most undergraduate courses emphasize on the fundamental aspects of various topics and areas of study. Upper level courses deal with specialized topics and incorporate material of particular current importance.

1.3 King Fahd University of Petroleum & Minerals (KFUPM)

KFUPM is a leading educational organization for science and technology. The University has adopted advanced training in the fields of science, engineering, and management as one of its goals in order to promote leadership and service in the Kingdom's petroleum and mineral industries. The University also furthers knowledge through research in these fields. The goal of KFUPM is, and has always been "the quest for excellence".

1.4 College of Computer Sciences & Engineering Mission

The mission of the CCSE is

- To prepare competent professionals in the areas of Computer Sciences, Computer Engineering and Systems Engineering who are competitive on a global scale, and will be efficient leaders in Saudi industry, academia and government.
- To conduct innovative basic and applied research that advances the frontier of knowledge and especially addresses local problems.

1.5 Program Educational objectives

The broad objectives of the undergraduate program in Computer Engineering are to instill in its graduates a solid foundation of mathematical, scientific, and engineering knowledge in addition to developing the intellectual skills essential for prosperity and success in their careers.

Objective #1 (Foundation)
To provide students with a solid foundation in the Computer Engineering discipline and design methodologies through emphasis on the application of mathematical, scientific, and engineering principles

Objective #2 (Skills & Tools)
To provide students with the skills needed to join the workforce well prepared in Computer Engineering core competencies. Graduates of the Computer Engineering Department should be able to:

a. Utilize and develop skills pertinent to engineering design, including the identification, analysis, and solution of professional problems through the use of appropriate analytical, computational and experimental tools;
b. Formulate engineering technological solutions to meet societal needs using computer engineering principles, tools, and practices.
c. Design, operate, maintain, and upgrade computer systems or networks as well as understand their interaction and impact on the society.
d. Link theory with practice and demonstrate analytical and proper decision making abilities while developing engineering systems or solutions.
e. Demonstrate proven engineering ability in the discipline by showing his ability to synthesize hardware/software schema for well-defined computer engineering problems.
f. Demonstrate recognizable quality in critical and independent thinking skills
g. Engage in life-long learning and demonstrate leadership in their chosen fields of work.
h. Demonstrate good communication skills both in report writing and in technical presentations

Objective #3 (Professional Practice & Ethics)
To provide students with the knowledge of proper ethical and professional practices relevant to Computer Engineering, as well as awareness of the societal impact of computer technologies.

The first objective is very much aligned with the Department's mission of providing the best quality education in Computer Engineering. The second objective focuses on the skills and opportunities provided to Computer Engineering graduates in terms of core competencies such as engineering design analytical skills, as well as critical & independent thinking skills. The third objective is aligned with the College and Department mission of addressing the needs of the local industry and the society, through graduating computer engineers who are not only technically competent but also ethically and professionally capable introducing new strategic computer industries and markets in the Kingdom of Saudi Arabia.

1.6 Strategic Plan

Department of Computer Engineering Vision Statement
To be a model department focused on the enhancement and sustenance of an academic environment conducive to excellence in teaching, research, and community service.

Department of Computer Engineering Mission Statement
The undergraduate program in Computer Engineering at KFUPM is designed to prepare students for technical positions in the industry as well as for graduate studies in related disciplines. Independent work is highly valued, offering opportunities for juniors and seniors to study a specialized topic in details, to participate in the research program with a faculty member, to learn and develop creative problem-solving skills, and to achieve a sense of accomplishment by carrying a project through from start to finish.

Goals, Strategies, and Benchmarking

The Department of Computer Engineering is committed to providing best quality education, conducting world-class research, addressing the fast evolving needs of the computer industry and the increasing demand of society.

Below we enumerate the department goals in terms of student performance, enhanced learning and research. The various elements of each goal are detailed followed by strategies that have to be adopted.

Benchmarks are also identified that define the various measures of success, which would be used over the next five years to quantify achievements and progress.

Goal #1 Undergraduate Learning

Provide the best possible quality undergraduate learning environment in Computer Engineering

Elements (Characteristics)

- Comprehensive, Breadth-based undergraduate program
- Conducive environment for developing technical, ethical, and leadership skills
- Strong hands-on-experience through laboratory experiments and projects
- Strong design and analysis components in education

Strategies

- Attract highly motivated and intellectual students (as reflected in their GPA score) to COE.
- Keep the COE curriculum up-to-date both in contents and quality of education offered.
- Keep the COE laboratories up-to-date not only in equipment and software tools, but also in the type and quality of conducted experiments.
- Attract and retain high quality COE faculty members.
- Achieve a faculty/students ration of 1:15.
- Attract as many as 15% of top undergraduate students to join the graduate program.
- Participate actively in establishing interdisciplinary programs.
- Strive to establish strong and continuous relationship with the industry in particular in the area of coop and summer training as well as in Senior Design Projects.

Benchmarks

- Introduce a revised version of the current undergraduate curriculum substantially equivalent to the best computer engineering undergraduate curriculum in North America.
- Undergraduate enrollment of a thousand students by the academic year 2006-2007. The current undergraduate enrollment is 750 students.
- A 50% increase in COE graduates per year by the academic year 2006-2007.
- Increase the number of students on the honor list by at least 10% over the next five years.
- Allocate a minimum of SR 10,000,000 per year during the next five years for new computing facilities, infrastructure enhancement, and laboratory development.
- Introduce at least one new area (program) in Computer Networks and another in a multi-disciplinary field such as Biomedical/Biocomputing, Mechatronics, Software-Hardware co-design, etc.

Goal #2 Graduate Education/Research

Be a world reputed Computer Engineering Department in graduate education, and basic & applied research.

Elements (Characteristics)

- Introduce a revised version of the current graduate COE program that is in line with those offered in highly reputed North American universities and provides the type of graduate students demanded by industry.
- Provide a research environment that is conducive for carrying out first class basic and applied research.
- Seek partnerships in computer research and education with the computer industry.
- Develop intensive recruiting programs to attract high quality MS and PhD candidates.

Strategies

- Expand the COE graduate student recruitment plans to achieve the required mass and momentum for substantial research outcomes through including in-house and client-funded research.
- Critically revise the graduate program admission requirements and the average time span of the MS degree program.
- Expand/improve research infrastructure in order to enhance research work in the department.
- Introduce new strategic research areas in computer engineering.
- Strengthen the research environment through the development of Post Doctoral Fellowship programs.
- Strengthen the research environment through the establishment of endowed Chair position(s) in key strategic research areas.
- Develop aggressive and highly visible educational and research opportunities for graduating COE senior students.
- Support high quality international conference attendance by both faculty and graduate students.

Benchmarks

- Achieve a graduate student enrollment of 100 (30% of which are PhD candidates) by the academic year 2006-2007.
- Achieve a faculty to graduate student ratio of 1:5
- Revise the current graduate admission policy to make it more in line with internationally accepted norms.
- Generate industrial funds to support stipends for at least 15 graduate candidates by 2006-2007.
- Pursue new strategic research areas, such as High Performance Computing,

Goal #3 Academic Research:

Achieve world-class level for education as well as basic, and applied research.

Elements (Characteristics)

- Internationally recognized faculty research
- Collaborative interdisciplinary research

Strategies

- Aggressively seeking external research funds to enhance and upgrade research infrastructure.
- Promote new initiatives for supporting faculty teamwork.
- Develop mechanisms to promote interdisciplinary research.
- Facilitate and promote international conference attendance.
- Develop measures to promote high quality research publications.
- Invite recognized researchers in various computer engineering areas to spend their sabbatical leaves at KFUPM.
- Instill policies allowing sabbatical leaves for COE faculty.

Measures (Benchmarks)

- Publication of at least two refereed papers per faculty per year of which one should be in a reputed journal.
- Submission of at least one research proposal per faculty per year.
- Participation in at least one research project every academic year by each faculty member

Goal #4 Industrial Partnership

Be a leading institution for supporting the technological advancement and economic growth of the local, national, and regional computer industry.

Elements (Characteristics)

- Hold long-term partnership in education and research with local and national computer industry.
- Enhance the relationship with industry with regard to Coop, Summer Training, and Senior Design Projects.
- Provide certification and short-term services in specific relevant academic areas to the community.
- Sponsor experience exchange programs with the industry.

Strategies

- Develop effective mechanisms for faculty/industry personnel exchanges.
- Develop effective mechanisms for faculty to conduct industrial/governmental consultation services.
- Establish a Program Advisory Committee (PAC) for consultation on undergraduate curriculum development and improvement and for setting long-term research directions.

Measures (Benchmarks)

- Establish the PAC by the end of the academic year 2003-2004.
- Generate external research fund in the amount of SR 2,000,000/year by the end of 2006-2007.
- Establish one endowed chair in the area of High Performance Computing by the end of 2004-2005.
- Increase the percentage of accepted research proposals by 10% by the end of 2004-2005.

Goal #5 Human Resources & Infrastructure:

Be a leading institution in human resource development and infrastructure utilization.

Elements (Characteristics)

- Highly motivated and dedicated faculty and support staff'
- Up-to-date fully equipped laboratories for both undergraduate and graduate teaching.
- Sufficient classroom, faculty and staff offices, and lab space.

Strategies

- Offer competitive salaries at all levels.
- Urge the University for providing 12-month departmental budget allocation.
- Acquire sufficient quota of laboratory and office space in the newly established building(s).
- Increase support and technical staff and provide them with regular training programs.

Measures (Benchmarks)

- Increase the lab space area for teaching/research laboratories by 1000 square meters by the end of 2006-2007.
- Establish a salary benchmark or standard at all levels.
- Establish a performance excellence award at all levels.

Standard 1-1: Program Objective
The program must have documented measurable objectives that support the college and university mission statements.

1.7 Program Objectives Assessment

Objective	How measured	When measured	Improvement identified	Improvement made
1	Surveys: Outcomes 1-2 have substantial contribution to the objective while outcomes 3-5 have moderate contribution to the objective.	Term 022	None	None
2	Surveys: Outcomes 2-3 have substantial contribution to the objective while outcomes 1 & 4 have moderate contribution to the objective.	Term 022	Design of efficient computer systems, Analysis of digital systems	Enhancing the design/analysis content of the COE Program
3	Surveys: Outcomes 4-7 have substantial contribution to the objective.	Term 022	Awareness of contemporary engineering issues, professional and ethical responsibility	Professional seminars/workshops, Professional Ethics in the course COE 390, Contemporary design issues in COE 400 and COE 485.

Standard 1-2: Program Outcomes
The program must have documented outcomes for graduation of students. It must be demonstrated that the outcomes support the program objectives and that graduating students are capable of performing these outcomes.

Program outcomes should demonstrate that our graduates have ability to:

1. Apply math, science and problem solving techniques to formulate adequate engineering solutions for:
   a. Design of new systems to meet certain specifications
   b. Formulate new hardware or software solutions to adapt technology to societal needs.
2. Design and conduct experiments, as well as analyse and interpret data,
3. Effectively utilize up-to-date tools for the design, modeling, analysis or verification of engineering systems.
4. Work cooperatively in multidisciplinary teams to produce an integrated system.
5. Communicate effectively with superiors or subordinates through report writing as well as technical presentations.
6. Demonstrate active lifelong learning capabilities.
7. Uphold and demonstrate best standard of professional and ethical practice and responsibility.

Standard 1-3: Assessment Results and Improvement Plans
The results of program's assessment and the extent to which they are used to improve the program must be documented.

Table 1: How the program outcomes support (aligned with) the program objectives

	Program Objectives									
Outcome	1	2(a)	2(b)	2(c)	2(d)	2(e)	2(f)	2(g)	2(h)	3
(1)	√	√	√	√	√	√	√			
(2)	√	√	√	√	√	√	√			
(3)	√	√	√		√		√	√		
(4)	√				√		√	√	√	√
(5)									√	
(6)	√	√		√	√	√	√	√		√
(7)	√	√	√		√					√

1.8 Program Outcomes Measurement

Three surveys were conducted in order to assess the performance of the COE graduates in light of the stated program objectives and program outcomes. These surveys are exit survey, alumni survey, and employers' surveys. The survey questions and the received responses are included in Appendix (C). The main observations drawn from these surveys are summarized below.

(A) Observations and recommendations related to Exit Surveys.

I. COE Faculty Contribution to Learning

Students' learning is an integral part of the COE Department's commitment to excellence in teaching. Out of the survey results, a positive feedback regarding faculty contribution to learning has been observed. Further refinement in faculty contribution to students learning should be considered. Followings are some guidelines

a. Use of different approaches to explain difficult as well as important concepts.
b. Encourage student-faculty interaction inside and outside the classroom.
c. Incorporate teamwork as an integral part of the leaning process.
d. Provide effective consultation and advising procedures.
e. Use of educational tools, e.g. multi-media animated figures and explanations, etc

II. COE Program

The results of the surveys showed that students, alumni, and employers appreciate the current COE program. The following recommendations should strengthen the program further.

a. Emphasizing writing and presentation skills.
b. Emphasizing experimental skills.
c. Strengthening the ability to design on different levels, i.e., system, component, and process.

III. Training

The followings are recommended to further strengthen the training aspect.

a. Emphasizing ability to carry out task independently
b. Emphasizing ability to identify one's strengths and weaknesses.

IV. University Facility

It is noticed that students gave low ratings for: Housing, Food services, Parking services, Security services, and Health services.

B. Observations and recommendations related to Alumni Surveys.

The Department was able to collect 57 responses from COE alumni. Following are some of the observations made by alumni (See Appendix C).

a. **Knowledge**: More that 90% of the alumni think that they have gained sufficient knowledge skills, which include engineering, problem-solving skills, etc. However, relatively, the ability to link theory to practice appears to be a concern for COE alumni.
b. **Communication Skills**: The alumni believe that they have excellent report writing skills, while they think that means to develop oral communication and presentation skills need to be developed.
c. **Interpersonal skills**: Among the interpersonal skills, the ability to work in teams was the lowest. However, the alumni responses show that they gained higher than average skills in professional development, appreciation of ethical values and independent thinking.
d. **Work Skills**: As for the work skills, the alumni think that they have gained excellent discipline and judgment skills but lack on time management skills.

The following represents some of the recommendations made by alumni.

- Create programs or initiate industries, though on a small scale, will enable COE graduates to sharpen their engineering skills
- Consider the industry and the IT business requirements.
- Provide more exposure to industry problems than just summer training.
- Consider teaching recent technology being used in our market such as UNIX, VB scripting and Microsoft technologies.
- Provide more concentration on developing time management skills.
- Exert more effort to improve presentation skills.

The COE Department appreciates receiving the above observations/recommendations from alumni. These should be taken into consideration in any curriculum revision. The followings are some of the recommendations the COE Department is contemplating in order to take the above alumni points into account.

1. Consider adding elective courses as per the market requirements (e.g. VB scripting).
2. Consider strengthening the COE 390 (Seminar) course by training students in the course on improving presentation and time management skills.
3. Consider improving summer training programs through more interaction with the local industry.
4. Consider training of students on how to deal with real life engineering problems. This can be done through improved versions of courses such as COE 400 and COE 485 or through the introduction of new course(s) on the issue.

C. Observations and recommendations related to Employers' Surveys.

The collected surveys represent a limited sample (only 21 responses were received). Following are the observations and recommendations made by employers (See Appendix C).

a. **Knowledge**: Most of the employers think that KFUPM-COE graduates possess sufficient knowledge skills such as engineering skills, collecting and analyzing data, problem-formulation skills.
b. **Communication Skills**: Employers agree with the alumni that they need more emphasis on the presentation skills.
c. **Interpersonal skills**: Employers think that KFUPM-COE graduates are highly motivated and reliable. However, they think that COE graduates need to develop skills in leadership and ability to work in teams.
d. **Work Skills**: Statistics drawn from employers' point of view indicate that the alumni need more time management skills, which agree with the alumni observation.

The following represents some of the recommendations made by employers.

- Provide more concentration on developing COE graduates time management skills.
- Concentrate on recent issues in computer industry that relate to the local market needs.
- Spend more effort on improving COE graduates presentation skills.
- Consider providing additional networking and local area networks courses.
- Consider involving students in team projects and improving their leadership skills.

The COE Department appreciates receiving the above observations/recommendations from the employers. These should be taken into consideration in any curriculum revision. The followings are some of the recommendations the COE Department is contemplating in order to take the above employers points into account.

1. Efforts are underway to establish a CISCO Equipment laboratory. This should provide further opportunities for students to learn about networking.
2. A survey will be conducted through industry candidates attending short courses held in the COE department. These participants can provide useful information about the industry needs and requirements. Results of such survey can then be taken into account in any upcoming curriculum revision.
3. Consider adding more elective courses on networking and computer systems engineering.
4. Consider strengthening the current curriculum with a number of IT-related courses. These could be core or elective courses.

Standard 1-4: Overall Performance using Quantifiable Measures

The department must assess its overall performance periodically using quantifiable measures.

Term	#of Graduating Students	First Honors (%)	Second Honors (%)	Third Honors (%)	Average Graduating GPA	Average time for completion (years)
021	50	10	6	4	2.56	6.48
022	65	15.4	15.4	6.15	2.75	5.64
023	20	0	5	5	2.5	5.6

1. Present students' enrollment indicating percentage of honor students, faculty students' ratio, average graduating GPA per semester, average time for completing the undergraduate program. Student enrollment for term 022 is 730. The faculty student ratio was 34.6 in 2000-2001 and 29.6 in 2001-2002. Following are the statistics regarding the graduating students in terms 021, 022 and 023.

2. Indicate percentage of employers that are satisfied with the performance of the department's graduates. Employer's survey was sent to around 30 employers. Their feedback is awaited.

3. Indicate the average student evaluation for all courses and the % of faculty awarded excellence in teaching award. Three faculty members received the excellence in teaching award from the University in the last three years. The average faculty evaluation for the term 021 was 8.22 for the lectures and 8.28 for the labs.

4. Present performance measures for research activities. This may include journal publications, funded projects, conference publications per faculty and the % of faculty awarded excellence in research awards. Two faculty members were awarded the

excellence in research award from the University in the last three years. During this period there were 28 journal publications and 81 conference publications from the faculty. Additionally, there were 6 books or chapters authored by the faculty in this period. There are 7 on-going projects which are supported by the University, KACST or SABIC. 8 more projects have been submitted for funding this year.

5. Present performance measures for community services. This may include the number of short courses, workshops and seminars organized. There were 13 short courses offered during the last three years by the faculty. Seven more short courses are planned for 2003.The department organized 20 seminars during the last three years, in which noted people from the academia and industry were invited to give lectures.

6. Indicate faculty and student satisfaction regarding to administrative services offered by the department. The graduating students completed a survey and following were the findings

Assessment Attribute	Agreed or Strongly Agreed %
The work in the program is too heavy and induces a lot of pressure	73
The program is effective in enhancing team-working abilities	72
The program administration is effective in supporting learning	72
The program is effective in developing analytic and problem solving skills.	81
The program is effective in developing independent thinking	63
The program is effective in developing written communication skills.	85
The program is effective in developing planning abilities	72
The mathematical content of the program is adequate for pursuing advanced courses in the program	50

In addition, most of the students proposed to increase the weight of the course projects. Some of them suggested having separate course projects rather than having the same project for all students

Eleven faculty members comprising two Professors, one Associate Professor, 7 Assistant Professors and one Lecturer responded to a survey regarding the administrative services offered by the department.

The following are the results of the survey:

	Satisfied %	Dissatisfied %	Neutral %
The mix of teaching, research and community services	18	64	18
The intellectual simulation of their work	36	10	54
The type of teaching and research they were involved in	64	10	26
Their interaction with the students	64	0	36

The cooperation they received from their colleagues	55	0	45
The mentoring available to them	18	18	64
The administrative services provided by the department	27	46	27
The clarity of the faculty promotion process	27	18	55
Their prospects for advancements and progress through the ranks	27	27	46
The compensation package	10	73	17
The job security in the department	30	36	34
The amount of time they had for themselves and their family members	0	81	19
The overall climate of the department	46	0	54

In addition, most of the faculty members surveyed

- demanded a fair compensation package,
- asked for a reduction in administrative work,
- requested an increase in the number of graduate students and
- requested balanced teaching assignments
- described the availability of funded research and keenness of the students to learn, as factors, which enhance their motivation.

Section 2: Curriculum Design and Organization

2.1 Degree Title

The program degree title is: *Bachelor of Science in Computer Engineerin***g**.

2.2 Definition of Credit Unit

One-semester credit hour represents one class hour or three laboratory hours per week. An academic semester represents 15 weeks of classes exclusive of final exams.

2.3 Degree Plan

The Computer Engineering Degree plan is shown below. It should be noted that there are two degree plans: One for a program with Co-op training and another for program without Co-op. The Co-op training is a continuous period of 28 weeks spent in industry with the purpose of acquiring practical experience in different areas of Computer Engineering. During this period, a student is exposed to the profession of Computer Engineering by working in the field. Students are required to submit a final report and give a presentation about their experience and the knowledge they gained during their cooperative work.

Computer Engineering Program

First Year (Preparatory)

Name	Num.	Title	LT	LB	CR	Name	Num.	Title	LT	LB	CR
MATH	001	Preparatory Math I	3	1	4	MATH	002	Preparatory Math II	3	1	4
ENGL	001	Preparatory English I	15	5	8	ENGL	002	Prep. English II	15	5	8
PE	001	Prep Physical Educ. I	0	2	1	PE	002	Prep. Physical Educ. II	0	2	1
ME	001	Prep. Shop I	0	2	1	ME	002	Prep. Shop II	0	2	1
Total			**18**	**10**	**14**				**18**	**10**	**14**

Total Credits required in Preparatory Program: 28

Second Year (Freshman)

Name	Num.	Title	LT	LB	CR	Name	Num.	Title	LT	LB	CR
MATH	101	Calculus I	4	0	4	MATH	102	Calculus II	4	0	4
PHYS	101	General Physics I	3	3	4	PHYS	102	General Physics II	3	3	4
CHEM	101	General Chemistry I	3	4	4	ICS	102	Introd. to Computing	2	3	3
ENGL	101	English Composition I	3	0	3	ENGL	102	English Composition II	3	0	3
IAS	111	Belief and its Consequences	2	0	2	IAS	101	Practical Grammar	2	0	2
						PE	101	Physical Education I	0	2	1
Total			15	7	17				14	8	17

Third Year (Sophomore)

COE	200	Fundam. of Comp. Eng.	3	3	4	COE	205	Comp. Org. & Ass. Lang.	3	3	4
EE	201	Electric Circuits I	3	3	4	EE	203	Electronics I	3	3	4
ICS	201	Introduction to CS	3	3	4	ICS	202	Data Structures	3	3	4
MATH	201	Calculus III	3	0	3	ICS	252	Discrete Structures	3	0	3
IAS	211	Ethics in Islam	2	0	2	MATH	260	Introduction to Linear Alg. & Diff. Equ.	3	0	3
						PE	102	Physical Education II	0	2	1
Total			14	9	17				15	11	19

Fourth Year (Junior)

COE	305	Microcomp. Syst. Design	3	3	4	COE	308	Computer Architecture	3	0	3
STAT	319	Prob &Stat. For Eng.&Sc.	2	3	3	COE	442	Computer Networks	3	3	4
COE	342	Data & Computer Comm.	3	0	3	COE	390	Seminar	1	0	1
COE	360	Principles of VLSI Desg.	3	0	3	ICS	xxx	ICS Elective	3	0	3
ENGL	214	Tech. Report Writing	3	0	3	xxx	xxx	Elective	3	0	3
IAS	201	Objective Writing	2	0	2	IAS	311	Islamic Shareah	2	0	2
Total			**16**	**6**	**18**				**15**	**3**	**16**

COE 399 COE Summer Training 0 0 0

Fifth Year (Senior)

COE	485	Senior Design Project	1	6	3	COE	400	Digital system Design	1	6	3
COE	4xx	COE Elective	3	0	3	COE	4xx	COE Elective	3	0	3
ICS	431	Operating Systems	3	3	4	COE	4xx	COE Elective	3	0	3
xxx	xxx	Elective	3	0	3	xxx	xxx	Elective	3	0	3
IAS	301	Literary Styles	2	0	2	IAS	4xx	IAS Elective	2	0	2
Total			**12**	**9**	**15**				**12**	**6**	**14**

Total Credits required in COE B.S. Degree Program is: 113 59 133

Computer Engineering Program (With Co-op)

First Year (Preparatory)

Name	Num.	Title	LT	LB	CR	Name	Num.	Title	LT	LB	CR
MATH	001	Preparatory Math I	3	1	4	MATH	002	Preparatory Math II	3	1	4
ENGL	001	Preparatory English I	15	5	8	ENGL	002	Preparatory English II	15	5	8
PE	001	Prep Physical Educ. I	0	2	1	PE	002	Prep. Physical Educ. II	0	2	1
ME	001	Prep. Shop I	0	2	1	ME	002	Prep. Shop II	0	2	1
Total			**18**	**10**	**14**				**18**	**10**	**14**

Total Credits required in Preparatory Program: 28

Second Year (Freshman)

Name	Num.	Title	LT	LB	CR	Name	Num.	Title	LT	LB	CR
MATH	101	Calculus I	**4**	0	**4**	MATH	102	Calculus II	4	0	4
PHYS	101	General Physics I	3	3	4	PHYS	102	General Physics II	3	3	4
CHEM	101	General Chemistry I	3	4	4	ICS	102	Introd. to Computing	2	3	3
ENGL	101	English Composition I	3	0	3	ENGL	102	English Composition II	3	0	3
IAS	111	Belief and its Consequences	2	0	2	IAS	101	Practical Grammar	2	0	2
						PE	101	Physical Education I	0	2	1
Total			**15**	**7**	**17**				**14**	**8**	**17**

Third Year (Sophomore)

COE	200	Fundam. of Comp. Eng.	3	3	4	COE	205	Comp. Org & Ass. Lang.	3	3	4
EE	201	Electric Circuits I	3	3	4	EE	203	Electronics I	3	3	4
ICS	201	Introduction to CS	3	3	4	ICS	202	Data Structures	3	3	4
						ICS	252	Discrete Structures	3	0	3
MATH	201	Calculus III	3	0	3	MATH	260	Introduction to Linear Alg. &Diff. Equ.	3	0	3
IAS	211	Ethics in Islam	2	0	2	PE	102	Physical Education II	0	2	1
Total			**14**	**9**	**17**				**15**	**11**	**19**

Fourth Year (Junior)

COE	305	Microcomp. Syst. Desgn.	3	3	4	COE	308	Computer Architecture	3	0	3
STAT	319	Prob &Stat. Eng.&Sc.	2	3	3	COE	442	Computer Networks	3	3	4
COE	342	Data & Comp. Comm.	3	0	3	COE	390	Seminar	1	0	1
COE	360	Principles of VLSI Desg.	3	0	3	ICS	xxx	ICS Elective	3	0	3
ENGL	214	Tech. Report Writing	3	0	3	xxx	xxx	Elective	3	0	3
IAS	201	Objective Writing	2	0	2	IAS	311	Islamic Shareah	2	0	2
						IAS	301	Literary Styles	2	0	2
Total			**16**	**6**	**18**				**17**	**3**	**18**
COE	350	Co-operative work	0	0	0						

Fifth Year (Senior)

COE	351	Co-op. Work (cont.)	0	0	9	COE	400	Digital system Design	1	6	3
						COE	4xx	COE Elective	3	0	3
						COE	4xx	COE Elective	3	0	3
						ICS	431	Operating Systems	3	3	4
						xxx	xxx	Elective	3	0	3
						IAS	4xx	IAS Elective	2	0	2
Total			**0**	**0**	**9**				**15**	**9**	**18**

Total Credits required in COE B.S. Degree Program with co-op is: 106 53 133

The COE Degree Requirements

The COE Department offers two options for its students. These are:
(1) B.S. in Computer Engineering and (2) B.S. in Computer Engineering with Co-Op.

The program requirements for each of these options are listed below.

Option I: B.S. in Computer Engineering.

Area	Courses	Credit-Hours
Basic Sciences	CHEM 101, PHYS 101, 102	**4** 4+4=**8**
Mathematics	MATH 101, 102, 201, 260 STAT 319	4+4+3+3=**14** **3**
English	ENGL 101, 102, 214	3+3+3=**9**
Physical Education	PE 101, 102	1+1=**2**
Islamic Studies and Humanities	IAS 111, 101, 211, 201, 311, 301, 4xx	2+2+2+2+2+2+2= **14**
Information & Computer Science	ICS 102, 201, 202, 252, 431, 353 (or 313)	3+4+4+3+4+3=**21**
Electrical Engineering	EE 201, 203	4+4=**8**
Electives	Xxx*, yyy, zzz	3+3+3=**9**
Computer Engineering	COE 200, 205, 305, 308, 342, 360, 390, 399, 400, 442, 485, 4xx, 4xx, 4xx	4+4+4+3+3+1+0+ 3+4+3+3+3+ 3+3=**41**
Total Credits		**133**

Option II: B.S. in Computer Engineering with Co-op

Area	Courses	Credit-Hours
Basic Sciences	CHEM 101, PHYS 101, 102	**4** 4+4=**8**
Mathematics	MATH 101, 102, 201, 260 STAT 319	4+4+3+3=**14** **3**
English	ENGL 101, 102, 214	3+3+3=**9**
Physical Education	PE 101, 102	1+1=**2**
Islamic Studies and Humanities	IAS 111, 101, 211, 201, 311, 301, 4xx	2+2+2+2+2+2+2= **14**
Information & Computer Science	ICS 102, 201, 202, 252, 431, 353 (or 313)	3+4+4+3+4+3=**21**
Electrical Engineering	EE 201, 203	4+4=**8**
Electives	Xxx*, yyy	3+3=**6**
Computer Engineering	COE 200, 205, 305, 308, 342, 360, 390, 400, 442, 4xx, 4xx	4+4+4+3+3+1+0+ 3+4+3+3+3= **35**
Co-Op	COE 350, COE 351	0+9=**9**
Total Credits		**133**

* xxx is a general elective which may include COE courses.

List of COE Courses

COE Core Courses

S.N.	Course	Title	Credit			Prerequisite
1-	COE 200	Fundamentals of Computer Engineering	3	3	4	Phys 102
2-	COE 205	Computer Organization and Assembly Language	3	3	4	COE 200 & ICS 201
3-	COE 305	Microcomputer System Design	3	3	4	COE 205
4-	COE 308	Computer Architecture	3	0	3	COE 205
5-	COE 342	Data & Computer Communications	3	0	3	STAT 319 (co-req.)
6-	COE 360	Principles of VLSI Design	3	0	3	EE 203
7-	COE 390	Seminar	1	0	1	JS
8-	COE 400	Digital system Design	1	6	3	COE 305&SS
9-	COE 442	Computer Networks	3	3	4	COE 342 OR CI
		Subtotal			**29**	

A-1. Option I (Regular)

1-	COE 399	Summer Training	0	0	0	ENGL 214, JS&DA
2-	COE 485	Senior Design Project	1	6	3	SS
		Subtotal	1	6	**3**	

A-2. Option II (Co-Op)

1-	COE 350	Cooperative Work	0	0	0	See details inside.
2-	COE 351	Cooperative Work (Continued)	0	0	9	
		Subtotal	0	0	**9**	

B. COE Elective Courses

1-	COE 402	Computer System Performance Evaluation	3	0	3	STAT 319 OR CI
2-	COE 403	Advanced Microprocessor Architecture	3	0	3	COE 305
3-	COE 405	Design and Modeling of Digital Systems	3	0	3	COE 308 OR CI
4-	COE 406	RISC Architectures	3	0	3	COE 308
5-	COE 409	Special Topics in Comp. Arch. & Dig. Syst. Des.	3	0	3	COE 308
6-	COE 410	Design of Sequential Systems	3	0	3	COE 200
7-	COE 420	Parallel Computing	3	0	3	COE 308
8-	COE 421	Fault-Tolerant Computing	3	0	3	COE 308
9-	COE 422	Real Time Systems	3	0	3	COE 305
10-	COE 423	Distributed Systems	3	0	3	SS
11-	COE 429	Special Topics in Parallel & Distributed Systems	3	0	3	SS
12-	COE 441	Local Area Networks	3	0	3	COE 342 OR CI
13-	COE 443	High Speed Networks	3	0	3	COE 342 OR CI
14-	COE 444	Internetwork Design and Management	3	0	3	COE 342 OR CI
15-	COE 445	Internet Information Services	3	0	3	SS
16-	COE 446	Mobile Computing	3	0	3	SS
17-	COE 449	Special Topics in Comp. Comm. And Networking	3	0	3	COE 342 OR CI
18-	COE 460	Advanced Digital Electronics	3	0	3	COE 360
19-	COE 462	Design Automation of VLSI Circuits	3	0	3	COE 360 OR CI
20-	COE 464	Testing of Digital Circuits	3	0	3	SS
21-	COE 465	VLSI System Design Methodology	3	0	3	COE 360
22-	COE 469	Special Topics in VLSI and Design Automation	3	0	3	COE 360
23-	COE 484	Introduction to Robotics	3	0	3	SS
24-	COE 487	Computer Vision Processing	3	0	3	SS
25-	COE 488	Data Acquisition Interfacing	3	0	3	COE 305
26-	COE 499	Special Topics in COE	3	0	3	SS
		Subtotal (Three COE Electives)			**9**	

List of other Core Courses

1-	ICS 102	Introduction to Computing	2	3	3	Math 101 or Math132
2-	ICS 201	Introduction to Computer Science	3	3	4	ICS 102
3-	ICS 202	Data Structures	3	3	4	ICS 201
4-	ICS 252	Discrete Structures	3	0	3	Math 101
5-	ICS 431	Operating Systems	3	3	4	ICS 232 or COE 205
6-	EE 201	Electric Circuits I	3	3	4	Phys 102, Math 102
7-	EE 203	Electronics I	3	3	4	EE 201

Curriculum Check List
B.S. in Computer Engineering (Regular)

Mathematics	cr	Gr	**Science**	cr	Gr	**Human. & Soc. Sc.**	cr	Gr
Math 101			Phys 101			IAS 111		
Math 102			Phys 102			IAS 101		
Math 201			Chem 101			IAS 211		
Math 260						IAS 201		
STAT 319						IAS 311		
						IAS 301		
						IAS 4xx		
						ENGL 101		
						ENGL 102		
						ENGL 214		
						PE 101		
						PE 102		

COE	**cr**	**Gr**
COE 200		
COE 205		
COE 305		
COE 342		
COE 360		
COE 308		
COE 442		
COE 390		
COE 485		
COE 400		
COE 399		

ICS	Cr	Gr		**EE**	cr	Gr
ICS 102				EE 201		
ICS 201				EE 203		
ICS 202						
ICS 252						
ICS 313 (or 353)						
ICS 431						

Curriculum Check List
B.S. in Computer Engineering (Co-op)

Mathematics	cr	Gr	**Science**	cr	Gr	**Human. & Soc. Sc.**	cr	Gr
Math 101			Phys 101			IAS 111		
Math 102			Phys 102			IAS 101		
Math 201			Chem 101			IAS 211		
Math 260						IAS 201		
STAT 319						IAS 311		
						IAS 301		
						IAS 4xx		
						ENGL 101		
						ENGL 102		
						ENGL 214		
						PE 101		
						PE 102		

COE	cr	Gr
COE 200		
COE 205		
COE305		
COE342		
COE360		
COE 308		
COE 442		
COE 390		
COE 400		
COE 399		
COE 350		
COE 351 (352)		

ICS	Cr	Gr		**EE**	cr	Gr
ICS 102				EE 201		
ICS 201				EE 203		
ICS 202						
ICS 252						
ICS 313 (or 353)						
ICS 431						

Electives to be taken by Undergraduate COE Students

All COE undergraduate students are required to take a number of electives. The details of the electives is given below

Co-op Students:	2 COE-4XX	(COE Electives)
	2 XXX-XXX	(Free Electives)
	1 ICS-XXX	(ICS-353 or ICS-313)
Non-Co-op Students:	3 COE-4XX	(COE Electives)
	3 XXX-XXX	(Free Electives)
	1 ICS-XXX	(ICS-353 or ICS-313)

- The COE department highly recommends that each student choose his set of electives so as to build a focus on one specialized area. Currently, the department has identified four areas. These are Communications & Computer Networks, Computer Applications, Computer Systems, and Software. The choice of the set of electives for the purpose of building a focus on a given track should be done in consultation with the student academic advisor.
- A student who wishes to specialize in one of the four identified COE tracks may choose four courses from the list shown in the following to fulfill his elective requirements.
- The ICS elective must be either ICS 353 Design and Analysis of Algorithms or ICS 313 Programming Languages.
- The COE electives can be any non-required COE 400-level course.
- An elective course should fulfill the following requirements:
    1. Registration for 200-level courses is generally discouraged unless it is absolutely necessary, such as being a prerequisite to a second elective, or it is the only available electives for a graduating student.
    2. The course should not be from ENGL, IAS, or PE departments.
    3. The course should not be similar to any core course in the COE program or any other elective taken.
    4. The course is highly recommended to be from the list of Recommended Electives and in any case should be on the provided list of approved electives. A course not appearing in that list may be taken if the advisor approves it and if it satisfies the above 3 requirements.

COE Electives Guidelines

This list is meant to guide students in selecting their COE electives. Students are recommended to select their electives according to the area in which they would like to build a specialty focus.

Communications & Networks Focus

COE 402	Computer System Performance Evaluation
COE 423	Distributed Systems
COE 441	Local Area Networks
COE 443	High Speed Networks
COE 444	Internetwork Design and Management
COE 445	Internet Information Services
COE 446	Mobile Computing
EE 207	Signals & Systems
ICS 353	Design and Analysis of Algorithms

Computer Applications

COE 402	Computer System Performance Evaluation
COE 422	Real Time Systems
COE 445	Internet Information Services
COE 488	Data Acquisition Interfacing
COE 484	Introduction to Robotics
COE 487	Computer Vision Processing
ICS 334	Database Systems

Computer Systems Focus

COE 402	Computer System Performance Evaluation
COE 405	Design and Modeling of Digital Systems
COE 406	RISC Architectures
COE 421	Fault-Tolerant Computing
COE 422	Real Time Systems
COE 462	Design Automation of VLSI Circuits
COE 464	Testing of Digital Circuits
COE 465	VLSI System Design Methodology
COE 488	Data Acquisition Interfacing

Software Focus

COE 402	Computer System Performance Evaluation
COE 420	Parallel Computing
COE 444	Internetwork Design and Management
COE 445	Internet Information Services
ICS 313	Fundamentals of Programming Languages
ICS 334	Database Systems
ICS 413	Software Engineering

List of Recommended (Technical) Electives

S.N.	Course #	Course Title	Credits	Prerequisites
1	ECON 403	Engineering Economics	3-0-3	None
2	EE 207	Signals & Systems	3-0-3	EE 201
3	EE 370	Communications Engineering I	3-3-4	EE 207, EE 203
4	EE 380	Control Engineering I	3-3-4	EE 207
5	EE 406	Digital Signal Processing	3-0-3	EE 370
6	EE 430	Information Theory & Coding	3-0-3	EE 315, EE 370
7	ICS 314	Object-Oriented Programming	3-0-3	ICS 313
8	ICS 331	Systems Software	3-0-3	ICS 202, ICS 232
9	ICS 334	Database Systems	3-3-4	ICS 202
10	ICS 353	Design and Analysis of Algorithms	3-0-3	ICS 202
11	ICS 413	Software Engineering	3-3-4	ICS 202
12	ICS 484	Arabization of Computers	3-0-3	SS
13	MATH 425	Graph Theory	3-0-3	Math 280 or Math 260
14	MATH 480	Linear & Non-Linear Prog.	3-0-3	Math 280, ICS 101, ICS 102, ICS 103
15	MGT 301	Principles of Management	3-0-3	J.S.
16	MIS 301	Business Systems Analysis & Design I	3-0-3	MS 215 or Departmental Approval
17	SE 303	Operation Research I	3-3-4	SE 201, SE 205 or STAT 319
18	SE 301	Numerical Methods	3-0-3	ICS 101, MATH 201
19	SE 305	Optimization Methods	2-3-3	SE 301, Co. SE 303
20	SE 320	Quality Control & Industrial Statistics	3-0-3	SE 205 or STAT 319, Co. SE 325
21	SE 405	Stochastic Systems Simulation	2-3-3	SE 205 or STAT 319

List of Approved (Technical) Electives

Course #	Course Title	Credits	Prerequisites
ARE 201	Architectural Graphics	0-6-2	-
ARE 443	Computer-Aided building Design	2-3-3	ARE 221
ARE 444	Knowledge-Based Systems in Buildings	2-3-3	ICS 102, ARE 221
CHE 453	Mathematical Methods in Chemical Engineering	3-0-3	SE 301 or SS
ECON 403	Engineering Economics	3-0-3	None
EE 207	Signals & Systems	3-0-3	EE 201
EE 303	Electronics II	3-3-4	EE 203
EE 340	Electromagnetics	3-3-4	EE 201, MATH 302
EE 370	Communications Engineering I	3-3-4	EE 207, EE 203
EE 380	Control Engineering I	3-3-4	EE 207
EE 400	Telecommunication Networks	3-3-4	EE 315, ICS 103
EE 406	Digital Signal Processing	3-0-3	EE 370, EE 380
EE 415	Analog Integrated Circuits Analysis & Design	3-0-3	EE 303
EE 417	Communication Engineering II	3-0-3	EE 315, EE 370
EE 420	Optical Fiber Communications	3-3-4	EE 340, EE 370
EE 430	Information Theory & Coding	3-0-3	EE 315, EE 370
EE 432	Digital Control Systems	3-3-4	EE 380
EE 433	Applied Control Engineering	3-3-4	EE 380
GEOL 454	Computational Methods in Geology	2-3-3	Dept. permission – JS
GS 423	International relations	3-0-3	None
ICS 313	Fundamentals of Prog. Languages	3-0-3	ICS 202
ICS 314	Object-Oriented Programming	3-0-3	ICS 313
ICS 331	Systems Software	3-0-3	ICS 202, ICS 232
ICS 333	File Processing	3-0-3	ICS 202
ICS 334	Database Systems	3-3-4	ICS 202
ICS 354	Automata and Language Translation Sys.	3-0-3	ICS 252
ICS 353	Design and Analysis of Algorithms	3-0-3	ICS 202
ICS 381	Introduction to Artificial Intelligence	3-0-3	ICS 251
ICS 413	Software Engineering	3-3-4	ICS 202
ICS 434	Advanced Database Systems	3-0-3	ICS 334
ICS 435	Computer Graphics	3-0-3	ICS 202

ICS 452	Theory of Computing	3-0-3	ICS 252
ICS 471	Parallel and Distributed Processing	3-0-3	ICS 431
ICS 481	Neural Networks	3-0-3	SS
ICS 482	Natural Language Understanding	3-0-3	SS
ICS 483	Computer Vision	3-0-3	ICS 381
ICS 484	Arabization of Computers	3-0-3	SS
ICS 485	Knowledge Based Systems	3-0-3	SS
MATH 301	Methods of Applied Mathematics	3-0-3	MATH 202
MATH 311	Advanced Calculus I	3-0-3	MATH 201
MATH 321	Introduction to Numerical Computing	3-0-3	MATH 201, ICS 101, ICS 102 or ICS 103
MATH 421	Introduction to Topology	3-0-3	MATH 311, MATH 232
MATH 425	Graph Theory	3-0-3	MATH 280 or MATH 260
MATH 430	Introduction to Complex Variables	3-0-3	MATH 201
MATH 442	Calculus of Variations & Optimal Control	3-0-3	MATH 202, MATH 280, MATH 311
MATH 460	Applied Matrix Theory	3-0-3	MATH 280
MATH 465	Ordinary Differential Equations	3-0-3	MATH 202, MATH 280
MATH 470	Partial Differential Equations	3-0-3	MATH 301
MATH 471	Numerical Analysis I	3-0-3	MATH 280, MATH 321, or SE 301
MATH 472	Numerical Analysis II	3-0-3	MATH 321, SE 301
MATH 480	Linear & Nonlinear Prog.	3-0-3	MATH 280, ICS 101, ICS 102, ICS 103
MIS 301	Business Systems Analysis & Design I	3-0-3	MIS 215 or Dept Approval
MIS 401	Business Systems Analysis & Design II	3-0-3	MIS 301
MIS 490	Information Resources Management	3-0-3	MIS 401, COE 353, SS
PETE 343	Special Topics on Petroleum Statistical Analysis	2-0-2	SE 301
PETE 402	Reservoir Simulation	3-0-3	PETE 301, SE 301
PHYS 201	General Physics III	3-3-4	PHYS 102, MATH 102
PHYS 211	Optics	2-3-3	PHYS 102

PHYS 212	Modern Physics	3-3-4	PHYS 102
PHYS 301	Classical Mechanics I	3-0-3	PHYS 101, MATH 202
PHYS 302	Classical Mechanics II	3-0-3	PHYS 301
PHYS 303	Experimental Physics I	2-3-3	PHYS 201 or PHYS 212
PHYS 304	Experimental Physics II	1-3-2	PHYS 303
PHYS 373	Introduction to Computational Physics	2-3-3	PHYS 212 or PHYS 201, ICS 101
SE 301	Numerical Methods	3-0-3	ICS 101, MATH 201
SE 303	Operations Research I	3-3-4	SE 201, SE 205, or STAT 319
SE 305	Optimization Methods	2-3-3	SE 301, Co. SE 303
SE 312	Instrumentation	2-3-3	EE 203
SE 320	Quality Control and Industrial Statistics	3-0-3	SE 205 or STAT 319, Co. SE 325
SE 325	Engineering Statistics	3-0-3	SE 205
SE 405	Stochastic Systems Simulation	2-3-3	SE 205 or STAT 319
SE 421	Operations Research II	3-0-3	SE 303
SE 438	Instrumentation for Process Control	2-3-3	SE 312
STAT 320	Statistical Quality Control	3-0-3	STAT 319 or STAT 201
STAT 355	Demographic Methods	3-0-3	STAT 201
STAT 361	Operations Research I	3-0-3	STAT 201 or Equivalent
STAT 365	Data Collection & Sampling Methods	3-0-3	STAT 201
STAT 411	Mathematical Statistics I	3-0-3	STAT 315
STAT 412	Mathematical Statistics II	3-0-3	STAT 411
STAT 415	Stochastic Processes	3-0-3	STAT 301
STAT 430	Experimental Design	3-0-3	STAT 302
STAT 460	Time Series	3-0-3	STAT 301
STAT 461	Operations Research II	3-0-3	STAT 361, STAT 301

List of All courses in the COE program

Course #	Course title	Status*	Credits
COE 200	Fundamentals of Computer Engineering.	R	(3-3-4)
COE 205	Computer Org. and Assembly Language	R	(3-3-4)
COE 305	Microcomputer System Design	R	(3-3-4)
COE 307	Computer Hardware	S	(3-0-3)
COE 308	Computer Architecture	R	(3-0-3)
COE 342	Data and Computer Communications	R	(3-0-3)
COE 350	Cooperative Work	R	(0-0-0)
COE 351/352	Cooperative Work (Continued)	R	(0-0-9)
COE 353	Fundamentals of Computer Communications	S	(3-0-3)
COE 360	Principles of VLSI Design	R	(3-0-3)
COE 385	Personal Computers	S	(2-3-3)
COE 390	Seminar	R	(1-0-1)
COE 399	Summer Training	R	(0-0-0)
COE 400	Digital system Design	R	(1-6-3)
COE 402	Computer Sys. Performance Evaluation	E	(3-0-3)
COE 403	Advanced Microprocessor Architecture	E	(3-0-3)
COE 405	Design and Modeling of Digital Systems	E	(3-0-3)
COE 406	RISC Architectures	E	(3-0-3)
COE 409	Special Topics in Comp. Arch. & Dig. Sys. Design	E	(3-0-3)
COE 410	Design of Sequential Systems	E	(3-0-3)
COE 420	Parallel Computing	E	(3-0-3)
COE 421	Fault-Tolerant Computing	E	(3-0-3)
COE 422	Real Time Systems	E	(3-0-3)
COE 423	Distributed Systems	E	(3-0-3)
COE 429	Special Topics in Parallel and Distributed Systems	E	(3-0-3)
COE 441	Local Area Networks	E	(3-0-3)
COE 442	Computer Networks	R	(3-3-4)
COE 443	High Speed Networks	E	(3-0-3)
COE 444	Internetwork Design and Management	E	(3-0-3)
COE 445	Internet Information Services	E	(3-0-3)
COE 446	Mobile Computing	E	(3-0-3)
COE 449	Special Topics in Computer Comm. & Net	E	(3-0-3)
COE 460	Advanced Digital Electronics	E	(3-0-3)
COE 462	Design Automation of VLSI Circuits	E	(3-0-3)
COE 464	Testing of Digital Circuits	E	(3-0-3)
COE 465	VLSI System Design Methodology	E	(3-0-3)
COE 469	Special Topics in VLSI	E	(3-0-3)
COE 484	Introduction to Robotics	E	(3-0-3)
COE 485	Senior Design Project	R	(1-6-3)
COE 487	Computer Vision Processing	E	(3-0-3)
COE 488	Data Acquisition Interfacing	E	(3-0-3)
COE 499	Special Topics in Computer Engineering	E	(3-0-3)

* R: Required E: Elective S: Service (offered for other departments)

2.4 Curriculum Breakdown

The curriculum breakdown in terms of mathematics and basic sciences, social sciences, major requirements, and other requirements is shown below.

Comparison with ABET Minimum Requirements

Name	Num.	Title	LT	LB	CR	Math& B. Sc	Engg. Sc.	Engg. Design	Hum&Soc.	Others
MATH	101	Calculus I	4	0	4	4				
PHYS	101	General Physics I	3	3	4	4				
CHEM	101	General Chemistry I	3	3	4	4				
ENGL	101	English Composition I	3	0	3					3
PE	101	Physical Education I	0	2	1					1
MATH	102	Calculus II	4	0	4	4				
PHYS	102	General Physics II	3	3	4	4				
ICS	102	Introd. to computing	2	3	3	1	2			
ENGL	102	English Composition II	3	0	3					3
PE	102	Physical Education II	0	2	1					1
IAS	111	Islamic Ideology	2	0	2				2	
COE	200	Fundamental of Comp Engg	3	3	4		2	2		
EE	201	Electric Circuits	3	3	4		3	1		
ICS	201	Introduction to CS	3	3	4		4			
MATH	201	Calculus III	3	0	3	3				
IAS	200	Arabic Essay	2	0	2				2	
COE	205	Comp. Org. & Assembly	3	3	4		2	2		
EE	203	Electronics I	3	3	4		2	2		
ICS	202	Data Structures	3	0	3	1	2			
ICS	252	Discrete Structures	3	0	3	3				
MATH	260	Linear Alg. & Diff. Eqn.	3	0	3	3				
IAS	222	Qur'an and Sunnah	2	0	2				2	
COE	305	Microcomp Design	3	3	4		2	2		
COE	342	Computer & Data Comm.	3	0	3	1	2			
COE	360	Principles of VLSI Design	3	0	3		1	2		
STAT	319	Prob. & Stat. for Eng. & Sc.	2	3	3	3				
IAS	300	Arabic Terminology	2	0	2				2	
ENGL	214	Tech. Report Writing	3	0	3				3	
COE	308	Computer Architecture	3	0	3		3			
ICS	431	Operating Systems	3	3	4		3	1		
ICS	xxx	ICS Elective	3	0	3		3			
IAS	333	The Islamic System	2	0	2				2	
COE	390	Seminar	1	0	0					1
COE	442	Computer Networks	3	3	4		3	1		
COE	xxx	Professional Elective	3	0	3					3
COE	xxx	Professional Elective	3	0	3					3
IAS	4xx	IAS Elective	2	0	2				2	
COE	485	Senior Design Project	1	6	3			3		
COE	400	System Design Laboratory	1	6	3			3		
IAS	4xx	IAS Elective	2	0	2				2	
COE	xxx	Professional Elective	3	0	3					3
xxx	xxx	Elective I	3	0	3					3
xxx	xxx	Elective II	3	0	3					3
xxx	xxx	Elective III	3	0	3					3
Total						**35**	**34**	**19**	**17**	**27**
ABET*						32	32	16	16	

List of Electives Courses in the COE program

Course #	Course title	Credits
COE 402	Computer Sys. Performance Evaluation	(3-0-3)
COE 403	Advanced Microprocessor Architecture	(3-0-3)
COE 405	Design and Modeling of Digital Systems	(3-0-3)
COE 406	RISC Architectures	(3-0-3)
COE 409	Special Topics in Comp. Arch. & Dig. Sys. Design	(3-0-3)
COE 410	Design of Sequential Systems	(3-0-3)
COE 420	Parallel Computing	(3-0-3)
COE 421	Fault-Tolerant Computing	(3-0-3)
COE 422	Real Time Systems	(3-0-3)
COE 423	Distributed Systems	(3-0-3)
COE 429	Special Topics in Parallel and Distributed Systems	(3-0-3)
COE 441	Local Area Networks	(3-0-3)
COE 443	High Speed Networks	(3-0-3)
COE 444	Internetwork Design and Management	(3-0-3)
COE 445	Internet Information Services	(3-0-3)
COE 446	Mobile Computing	(3-0-3)
COE 449	Special Topics in Computer Comm. & Net	(3-0-3)
COE 460	Advanced Digital Electronics	(3-0-3)
COE 462	Design Automation of VLSI Circuits	(3-0-3)
COE 464	Testing of Digital Circuits	(3-0-3)
COE 465	VLSI System Design Methodology	(3-0-3)
COE 469	Special Topics in VLSI	(3-0-3)
COE 484	Introduction to Robotics	(3-0-3)
COE 487	Computer Vision Processing	(3-0-3)
COE 488	Data Acquisition Interfacing	(3-0-3)
COE 499	Special Topics in Computer Engineering	(3-0-3)

COE-program-list-electives-2752003

2.5 Currently Approved Course Syllabi

The course description according to the ABET format is shown in Appendix F. For each course in the program, which can be counted towards credit hours, the following have been specified:

- Course title
- Course objectives and outcomes
- Catalog description
- Text book(s) and references
- Syllabus breakdown in lectures
- Computer usage
- Laboratory

2.6 Assessment of the COE Curriculum

Standard 2-1: Courses versus Objectives

The curriculum must be consistent and support the program's documented objectives.

A table linking the courses to the program outcomes is shown below.

Courses or Group of courses	Program Outcomes						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
COE 200, COE 205, COE 305, COE 360	√	√	√				
COE 400, COE 485	√	√	√	√	√	√	√
COE 399, COE 350, 351, 352[1]	√	√	√	√	√	√	√
COE 390					√	√	√
COE 308	√						
COE 342	√	√					
COE 442	√	√					
ICS Courses	√	√	√	√			
STAT & MATH, Physics & Chemistry Courses	√			√			
English Courses					√		
IAS Courses					√		√
EE Courses	√	√	√				
Technical Electives	√			√		√	
COE Electives	√					√	

Standard 2-2: Theory, Problem Analysis and Solution Design
Theoretical background, problem analysis and solution design must be stressed within the program's core material.

The COE courses that contain a significant portion (30% or more) of the elements shown in standard 2-2 are listed below.

Element	Courses
Theoretical background	All courses with the exception of ENGL, IAS, and PE, (COE 350 , 351, 352), COE 390, and COE 399.
Problem analysis	All courses with the exception of ENGL, IAS, and PE, and COE 390,
Solution design	COE 200, COE 205, COE 305, COE 360, COE 400, COE 485, ICS 202, ICS 431, COE 399, (COE 350, 351, 352)

[1] *These are summer training and cooperative training courses. Depending on the nature of the training program, it is possible to satisfy any of the stated program outcomes*

Standard 2-3: Mathematics and Basic Sciences Requirements
The curriculum must satisfy the mathematics and basic sciences requirements for the program, as specified by the respective accreditation body.

The COE program satisfies the mathematical and basic sciences requirements as specified by ABET. The ABET requirement is 32 credit hours whereas the COE program has 35 credit hours for mathematics and basic sciences. This is also seen in Table – 'Comparison with ABET Minimum Requirements' provided earlier in section 2.4.

Standard 2-4: Major Requirements as Specified by Accreditation Body
The curriculum must satisfy the major requirements for the program as specified by the respective accreditation body.

The COE program satisfies the 'Major' credit hours requirements as specified by ABET. The ABET requirement is 42 'Major' credit hours out of which a minimum of 12 credit hours must be for 'Design'. The COE program has 61 Major 2 credit hours out of which 20 credit hours are engineering design

Standard 2-5: Humanities, Social Sciences, Arts, Ethical, Professional & Others
The curriculum must satisfy humanities, social sciences, arts, ethical, professional and other discipline requirements for the program, as specified by the respective accreditation body.

ABET requirements a minimum of 16 credits for social sciences while the COE programs covers 17 credit hours.

Standard 2-6: Information Technology Contents
Information technology component of the curriculum must be integrated throughout the program.

Information technology contents of the COE program are summarized below.

Course	IT Contents
COE 200	Use of CAD tools for the design, simulation and synthesis of digital system
COE 205	Use MACRO assemblers to write assembly code for various applications.
COE 305	Assembly Programming and Microprocessor Interfacing
COE 360	Use of CAD tools for the design, simulation and synthesis of VLSI circuits
COE 442	Network simulators are used to analyze network performance
ICS courses	Language compilers and development tools are used to build large software projects
EE courses	Use Circuit analysis CAD tools, e.g. SPICE
COE 400 and 485	Use various CAD tools for design entry, modeling,

[2] *ICS courses are counted as part of the Major credit hours*

	verification, fabrication (e.g. on PCB) and synthesis

Standard 2-7: Communication Skills
Oral and written communication skills of the student must be developed and applied in the program.

The COE Department ensures the development of competence in oral and written communications in the English language for its students through the following means.

1. English courses offered in the Preparatory Year Program (PYP)
2. Two Freshman level English courses ENGL 101 “English Composition I” and ENGL 102 “English Composition II”
3. A dedicated English course ENGL 214 -“Technical Report Writing”
4. Junior/Senior core COE courses require technical report writing and professional presentations.
5. Most of the COE Elective courses require technical report writing and professional presentations.
6. A dedicated course COE 390 through which students are trained on how to make professional presentations.
7. The senior project design course (COE 485) requires a student to provide a written report and deliver a professional oral presentation of his project work.

Section 3: Laboratories and Computing Facilities

3.1 Introduction

There are nine laboratories in the COE department. The detailed information about these labs is listed below:

1 – FPGA/Digital Logic Design Lab

Lab Title	**FPGA/Digital Logic Design Lab**
Location and Area	22-333-1 / 39 square meters
Objectives	Hands on experience in digital logic design, simulations and implementation using Xilinx FPGAs and software.
Adequacy for Instruction	Good
Courses Taught	COE200
Available Software	Xilinx Student Edition 2.1i
Major Apparatus	--
Major Equipments	PCs and FPGA development boards (Digilab Xess Boards)
Safety Regulations	Same as all labs

2 – Microprocessor Lab

Lab Title	**Microprocessor Lab**
Location and Area	22-340B / 59.13 square meters
Objectives	To expose the student in the lab to various aspects of microprocessor engineering including signal analysis, design and fabrication of a medium-sized microprocessor system, conducting I/O interfacing experiments, hardware troubleshooting.
Adequacy for Instruction	Excellent
Courses Taught	COE 305 – Microcomputer System Design
Available Software	80x86 Assembler and Debugging tools, Flight FLT86 Software
Major Apparatus	LCD Projector
Major Equipments	- Personal Computers - 8086 Microprocessor kits - I/O Interfacing boards - Signal Analyzers - Signal generators - Oscilloscopes - EPROM programming facility - Breadboards, PCBs and other accessories
Safety Regulations	Same as all labs

3 – Data Communication and Network Lab

Lab Title	Data Communication and Network Lab
Location and Area	22/347-A / 77.13 m^2
Objectives	To give undergraduate and graduate students the opportunity of having hands-on experience with state-of-the art network products and technologies (hardware as well as software).
Adequacy for Instruction	Good
Courses Taught	COE 442 and ICS342
Available Software	Operating systems NT, 2000, XP, Linux and various network sniffers and monitors
Major Apparatus	LCD Projector
Major Equipments	PCs, modems, web cams, Ethernet cards, ATM cards, Ethernet switches, Ethernet routers, Layer 3 switches, and ATM switches
Safety Regulations	Same as all labs

4 – Digital System Design Lab

Lab Title	Digital System Design
Location and Area	22-347B / 77.13 m^2
Objectives	To introduce students to digital system design concepts with particular emphasis on Microcontroller-based systems and real time software.
Adequacy for Instruction	Good
Courses Taught	COE400
Available Software	8051 Microcontroller debugger, VB6, COM debug for serial communication, Assembler/Linker, Protel (PCB layout software), and OrCAD (Schematic design tool).
Major Apparatus	LCD Projector
Major Equipments	PCs, oscilloscopes, power supplies, function generators, EPROM programmers, Digital design boards, Microcontroller chips, EPROMs, EEPROMS, TTL chips, motors, fans, buzzers, reed switches, LDRs, and various sensors.
Safety Regulations	Same as all labs

5 – Senior Project Lab

Lab Title	Senior Project Lab
Location and Area	22-339 / 25 square meters
Objectives	To support students project development and prototyping.
Adequacy for Instruction	N/A
Courses Taught	N/A
Available Software	Java, VB6, W2000
Major Apparatus	--
Major Equipments	PCs, Logic analyzers, Oscilloscopes, power supplies, function generators, ICs, and cables.
Safety Regulations	Same as all labs

6 – Robotics Lab

Lab Title	Robotics Lab
Location and Area	22-339 / 25 square meters
Objectives	To support research and teaching (both undergrad and graduate) in Robotics
Adequacy for Instruction	Limited (3 to 4 student stations)
Courses Taught	COE 484 and senior projects
Available Software	PUMA 560 OS and Robot Programming, A distributed components Client-server framework for telerobotics, Vision system, multistreaming of stereo vision system over LAN
Major Apparatus	VAL II Plus system
Major Equipments	PUMA 560 Robot System and Controller
Safety Regulations	Same as all labs

7 – Assembly & Comp Organization Labs

Lab Title	Computer Organization and Assembly Language
Location and Area	22-335 / 98.55 square meters and 22-410 / 78.84 square meters
Objectives	To support teaching in the area of assembly programming and computer organization
Adequacy for Instruction	OK
Courses Taught	COE205
Available Software	Windows Assembler, Debuggers, and Windows
Major Apparatus	LCD Projector
Major Equipments	PCs
Safety Regulations	Same as all labs

8 – Performance Engineering Lab

Lab Title	Performance Engineering Lab
Location and Area	23-16C / 57.96 square meters
Objectives	Performance evaluation of parallel, distributed, and network infrastructure applications and architectures
Adequacy for Instruction	Inadequate space; useful as a research lab
Courses Taught	COE610, COE591
Available Software	MPI, Webstone, Webbench, Web Polygraph, VTune, Ethereal, Netperf, LMBench, NAS Benchmarks
Major Apparatus	Scanner
Major Equipments	Cisco Gigabit switch, 100 Mbps switch, 10/100 Mbps hub, a cluster of 8 Pentium IV PCs, a cluster of Pentium III PCs, several Pentium II PCs, switch cabinet, and desks
Safety Regulations	Same as all labs

9 – Printed Circuit Board Lab

Lab Title	Printed Circuit Board Laboratory
Location and Area	23-019 / 87 square meters
Objectives	This lab supports digital system design courses and senior projects. The lab houses all equipment and chemicals necessary to make a professional printed circuit board starting from scratch.
Adequacy for Instruction	N/A
Courses Taught	N/A
Available Software	Protel for Windows
Major Apparatus	--
Major Equipments	- Repromaster 3600 – Photo image reproduction machine - Light Box (back light) – editing - Single and Double sided UV unit – Ultraviolet exposing unit - CP 530 Machine - developing exposed copy-proof material - PCB Shear (cutter) – cutting PCB - TX Optical Drilling machine – drilling holes - Soldering / Desoldering Stations - Inspection binocular - Laboratory oven - Roller Tinning Machine - Photopolymer dry film laminator – laminating photo resist film onto copper coated boards - SMD Rework Station - CNC 1000 Drilling/Routing machine - PB 720 Bench line (PCB Production line) – PCB chemical processing units Bench Top Board drying Machine – drying wet circuit board - PL903/4 Copper plating System – through hole plating - Screen Printing Unit
Safety Regulations	Same as all labs plus the following additional regulations: - If you are doing something you are not sure of or familiar with, ask. - Do not try to operate machines without supervision. - Wear protective suit/ gown and gloves when handling chemicals. - Wear protective eye shields when drilling and handling chemicals. - Wear nuisance dust mask to avoid inhaling toxic chemicals and dust particles. - No food or drinks are allowed in the working area.

3.2 Safety Procedures for all COE labs

IN CASE OF FIRE:

1. Turn the equipment off. If power switch is not immediately accessible, take the plug off

2. If the fire continues, try to curb the fire if possible by using the FIRE EXTINGUISHER or by covering it with a HEAVY CLOTH. If possible isolate the burning equipment from the other surrounding equipment.
3. Sound the fire alarm by activating the nearest alarm switch located in the hallway.
4. Call SECURITY and EMERGENCY Department immediately:

EMERGENCY:	4444
SECURITY:	3131

IN CASE OF INJURY OR ELECTRIC SHOCK:

1. Try to break the contact of the victim with live electric source. Use an insulator such as fire wood or plastic to break the contact. Do not touch the victim with bare hands to avoid the risk of electrifying yourself.
2. Unplug the faulty equipment. If main circuit breaker is accessible, turn the circuit off.
3. If the victim is unconscious, start resuscitation immediately. Use your hands to press the chest in and out to continue breathing function. Use mouth-to-mouth resuscitation if necessary.
4. Immediately call medical emergency and security. Remember! Time is critical; be fast.

AMBULANCE:	3333
SECURITY:	3131

GENERAL INSTRUCTIONS:

Labs are equipped with low current equipment, which are electrically grounded properly for your safety.

- Do not move equipment to/from the lab without the knowledge and permission of the lab engineer.
- Do not operate any device unless you know its operating instructions and functions.
- After you are finished with the experiment, please:

Make sure that:

- You turn off the Power supplies, Oscilloscopes, Digital Design boards, Testers, Logic Analyzers, Personal Computers (if necessary), and any other equipment connected to the mains electricity.
- Return all IC chips into proper drawers of the cabinet
- Collect all loose wires and put them in the wire box.

Standard 3-1: Lab Manuals/Documentation/Instructions
Lab manuals/documentation/instructions for experiments must be available and readily accessible to faculty and students.

- For all teaching labs, both instructors and students are provided with hard copies of the lab manuals and other documentation. Additional copies are also kept in the labs.

Soft copies of some of these manuals are available and accessible through the COE department web page.

- The teaching labs are very adequate and compare favorably with those found in major reputable institutions. The research labs, however, are very inadequate. The department needs at least four more research labs.

Standard 3-2: Adequate Personnel Support for Labs

There must be adequate support personnel for instruction and maintaining the laboratories.

- There is very limited lab support in terms of personnel. There is only one lab engineer/technician in the COE department who also acts as the only maintenance engineer in the CCSE College. He has additional duties towards the CCSE network technical administration. As a result only 40% of his time is devoted for COE lab support, which is inadequate. This support is mainly in the form of maintenance, inventory management and control.

- For the departmental labs to achieve their goals within the program objectives, adequate personnel support must be provided. This means that there should be one lab engineer per lab in addition to a general maintenance engineer/technician for all the labs.

Standard 3-3: Adequate Computing Infrastructure and Facilities
The University computing infrastructure and facilities must be adequate to support program's objectives.

- All faculty members and students have adequate access to state-of-the-art computing facilities. These include high-end PCs, workstations (Sun and Linux) and servers. Also all departmental labs are equipped with PCs. The research-oriented Performance Evaluation Lab also contains a large number of PCs that can be clustered for special computations.

- The computing facilities, in general, are similar to those found in major reputable universities. One shortcoming in our computing support is the ability to setup networking in open areas outside computer labs (i.e. wireless networking). This would give the students unconstrained access to the intranet and other resources.

Section 4: Student Support and Guidance

4.1 Introduction

One basic principle that governs our care and support measures for COE students is the provision of the best possible academic advising. The 'KFUPM Undergraduate Bulletin' published by the university every two years, addresses the program requirements of all colleges. In addition to this, the COE Department has a dedicated "Student Guide" for its students which includes all required information about the curriculum, courses, prerequisite requirements, and template degree plans for both coop and non-coop students. The COE Student Guide is available to all students both online and as a paper document. Although students can early-register as well as drop and add courses without their academic advisors, yet they are highly encouraged to consult them for clarifications and expert opinions on curriculum matters. The COE faculty members dedicate extra office hours during registration period for students' help and guidance. The department also holds a student-faculty gathering once every year during which students and faculty can exchange views about curriculum matters in a relaxed and friendly setting.

4.2 Courses

Standard 4-1: Sufficient Frequency of Course Offering
Courses must be offered with sufficient frequency and number for students to complete the program in a timely manner.

4.2.1 Core Courses

All COE core courses are offered every term per year except COE 399 (Seminar), which is offered only during the second term of the year. These core courses offered every term are: COE 200, COE 205, COE 305, COE 308, COE 342, COE 351, COE 353, COE 360, COE 390, COE 400, and COE 442.

4.2.2 Elective Courses

COE elective courses are frequently offered depending on three main factors:

- Student demand
- Faculty expertise and interest
- Country need and higher education goals

For example, during the academic year 2002-2003, the COE department offered the following ten elective courses:

Table 2: Elective courses offered in COE during terms 021 & 022

During both terms: 021&022	First term: 021	Second term: 022
COE 421 COE 441 COE 444 COE 446 COE 485	COE 405 COE 484	COE 420 COE 443 COE 464

4.2.3 Core Courses offered by other Departments

All required courses outside the department are offered every term. These are:

English Courses: ENGL 101, ENGL 102, ENGL 214
Computer Science Courses: ICS 102, ICS 201, ICS 202, ICS 252, ICS 431
Mathematics Courses: MATH 101, MATH 102, MATH 201, MATH 260, and STAT 319
Physics Courses: PHYS 101, PHYS 102
Electrical Engineering Courses: EE 201, EE 203

It should be noted that all COE courses and there descriptions could be obtained from the web at the following URL:
http://www.ccse.kfupm.edu.sa/ccse/COE_Website/coe_website.html

4.3 Structure of Courses

Standard 4-2: Effective Faculty/Student Interaction
Courses in the major must be structured to ensure effective interaction between students, faculty and teaching assistants.

The following principles are observed in order to ensure effective interaction between students and faculty in the courses offered.

- Classes are made of small groups averaging a maximum of 20 students per class.
- Students are required to attend their classes regularly and on time. More than 20% unexcused absences of a student in any course will subject him to scoring a "DN" (denial) grade.
- Faculty members are required to post their office hours as well as announce it to their students as part of the course outline distributed at the beginning of the term. Department ensures strict observance of the office hours.
- Typically a given COE course includes as part of the "Course Work" two major exams, a number of quizzes, and a number of homework assignments. This scheme encourages students to be in constant contact with their instructors and subject material.
- Almost all 400-level COE courses require students to conduct a "Course Project". This activity augments student/faculty interaction especially during the preparation of the project report and presentation.
- All multi-section courses are assigned a course coordinator to ensure reasonable uniformity.

4.4 Guidance to Students

Standard 4-3: Professional Advising and Counseling
Guidance on how to best complete the program and access to qualified advising must be available to all students to make course decisions and career choices

Students are informed about program requirements from the provided COE student guide. An online copy is also made available at the following URL:
http://www.ccse.kfupm.edu.sa/coe/text/bs_courses/bs.htm

4.4.1 Student Advising System

The following can be said about the advising system and how its effectiveness is measured.

a. With on-line registration, advisor no longer has a strong role in enforcing the department policy.
b. The key role of advisor these days can be summarized in two points:
   i. Providing the student pin number to access his account on the registrar site
   ii. Helping student in resolving some conflicts in his registration
c. There is no process defining the advising system effectiveness or data measuring this effectiveness.

4.4.2: Student Counseling System

The following can be said about the student counseling system and how students get professional counseling when needed

a. The university has established a special office called "Counseling and Advising Center (CAAC)" (http://www.kfupm.edu.sa/caac/) under the Deanship of Student Affairs for this purpose.
b. The center provides the following counseling services:
   i. Individual Counseling: A student meets with a counselor on a one-to-one basis to work through personal concerns.
   ii. Group Counseling: Counseling in groups offers a broad range of insight and support from peers and professional counselors.
   iii. Couples Counseling: Couples counseling works toward alleviating the strains in a close relationship. In such cases, one of the relatives, usually the father or a brother, are contacted and asked to visit the center.
c. Counseling is a collaborative process, which involves the development of a unique, confidential help-oriented relationship. The CAAC treats all of its contacts with students in a highly confidential manner.
d. The CAAC has a number of professionals specialized in social counseling.

4.4.3: Opportunities for Students

The following points summarize the opportunities available for students to interact with practitioners, and to have membership in technical and professional societies.

a. Career day
   i. Held once a year during the second term
   ii. Career Day is an annual four-day event organized by the university in which companies and institutions are invited to exhibit their field of activity, offer their employment/training opportunities, and become acquainted with the university and its range of specializations

b. Open day

The Open Day is an annual event organized by the university during the first term of the year that extends for several days to which companies and institutions are invited to exhibit their fields of activity, offer their employment/ training opportunities, and become acquainted with the university and its range of specializations.

c. Cooperative Program
    i. Cooperative education is a structured educational strategy, integrating theoretical knowledge learned in the classrooms and laboratories with real world experiences.
    ii. COOP students are required to spend 28 weeks of practical work in a relevant field in an industry

d. Summer training program

    The summer training program is similar to the cooperative program in its objectives except that it lasts for eight (8) weeks.

Section 5: Process Control

5.1 Introduction

The major functions of the program consist of student admission, student registration, faculty recruitment, teaching, and graduation. The processes for performing these functions are documented and conducted in an organized manner. They are controlled, evaluated and continuously monitored and improved. The details of these processes are described below.

Standard 5.1: The process by which students are admitted to the program must be based on quantitative and qualitative criteria and should be clearly documented. This process must be periodically evaluated to ensure that it meets its objectives.

5.2 Program admission criteria, policies regarding program/credit transfer

The process of admitting the students to the program is clearly documented by the Deanship of Admission and Registration and is carried out on quantitative and qualitative bases. Evaluation of this process is performed every semester to ensure that its objectives are met. The process consists of well-defined procedures and steps executed at the university, college, and departmental levels.

Based upon the recommendation of the college councils and the Deanship of Admission and Registration in coordination with the Deanship of Educational Services, the number of new students to be admitted in the following academic year is determined by the University Council.

The students admitted to the University must have satisfied the following conditions:

1. Obtained the secondary school certificate or its equivalent from within inside or outside the Kingdom of Saudi Arabia.
2. Obtained the secondary school certificate in a period less than 5 years prior to the date of application. However, the University Council may waive this condition if the applicant has a satisfactory explanation.
3. Have a record of good conduct.
4. Have successfully passed any examinations or personal interviews as determined by the University Council.
5. Must be physically fit and healthy.
6. Have approval from employers in case he is employed.
7. Must satisfy other conditions the University Council may deem necessary at the time of application for admission.

Evaluation of students is done according to their performance in the secondary school examinations, interviews, and the admission examinations. Students satisfying all the admission requirements with the highest scores and significant records are enrolled. Personal and academic information, along with the results of the admission exams are stored electronically. Each enrolled student is also assigned a unique identification number.

Newly admitted students are enrolled in the preparatory year program in the University before starting their undergraduate program. The courses covered in the two-semester

preparatory year include English, Mathematics, Graphics, Workshop, and Physical Education. However, students may be exempted from the preparatory year program provided that their proficiency in English and mathematics in a promotion exam is established. These promotion exams are conducted in the beginning of each semester (except for the summer session). Students who pass the requirements of either the English or mathematics sections, are partially promoted to the next academic level, but are required to fulfill the remaining requirements within the same year. The preparatory year requirement is fulfilled by completing all the required courses with a grade of C or better in the first and second level courses of both English and mathematics.

Once the students successfully complete the preparatory year, they select their majors immediately. Qualified students are admitted directly into the selected majors of the undergraduate program as freshmen. The Deanship of Admission and Registration communicate lists of new freshmen students of each major to the concerned departments at the beginning of each semester.

5.2.1 Transfer from outside the university

a) The transfer of a student from outside the University may be accepted under the following conditions:

1. The student should have been enrolled at a recognized college or university.
2. The student must not have been dismissed from that institution for disciplinary reasons.
3. The student must satisfy the transfer provisions as determined by the University Council.

All transfer applications are submitted to the Admission and Academic Standing Committee, which evaluates and ensures that the applicant fulfills the mentioned requirements, in addition to any other provisions the committee deems necessary, in coordination with the colleges concerned.

b) The Council of the College of Engineering Sciences reviews the courses taken by the student outside the University based on the recommendations of the department, which offer equivalent courses. The courses are usually evaluated by the Curriculum Committee in the department and approved by the Chairman. The courses evaluated as equivalent will be transferred to the student's record but will not be included in the calculation of his cumulative GPA.

In order to get transfer of credit for any course taken outside the University, the student should:

1. Have obtained a grade of C or higher in that course;
2. Have taken the course at a recognized college or university;
3. Have taken a course equivalent in all respects to one of the courses, which are included in the KFUPM degree requirements;
4. The grade earned by the student in the course is not included in student’s cumulative GPA.

c) If, after his transfer, it is discovered that a student had been dismissed from his previous university for disciplinary reasons, his enrollment will be considered canceled as from the date of acceptance of his transfer to the University.

5.2.2 Transfers to the program from another college in the university

A student may be transferred from another college to the program inside the university in accordance with University Council rules as follows:

1. A student may transfer from another college within the university into the program before he completes the sixth academic level.
2. The student should continue to study all the courses registered for at the level preceding the transfer, in compliance with the adding and dropping rules.
3. The transfer from one college to another will be recorded in the academic record of the student the term following his transfer.
4. A student is allowed a maximum of two transfers from one college to another.

The academic record of a student transferred from one college to another includes all the courses he has studied together with the grades and the semester and cumulative GPAs obtained throughout his period of study at the university.

5.2.3 Transfer to the program from another major within the college

a) With the approval of the Dean of the College of Computer Science and Engineering, a student may transfer from one major within the college to the program according to the following rules:

1. A student may transfer from one major to the program at any time before he completes the sixth academic level. The Council of the College of Computer Science and Engineering may consider exceptional cases where students have already completed the sixth level.
2. The transfer will be recorded in the academic record of the student at the beginning of the term following the transfer.
3. A student is allowed a maximum of two transfers from one major to another within the same college. The college council may consider exceptional cases.

b) The academic record of a student transferring from one major to another will include all the courses the student has taken, including the grades and the semester and cumulative GPAs obtained throughout his period of study at the University.

The detailed policies and regulations regarding credit transfer of students are described in the KFUPM Undergraduate Study and Examinations Regulations booklet.

5.3 Process of registration

Standard 5-2: The process by which students are registered in the program and monitoring students' progress to ensure timely completion of the program must be documented. This process must be periodically evaluated to ensure that it meets its objectives.

To ensure that all active students are registered in the program, registration process is conducted in many steps. The first is the early registration, which takes place in the first and second semester of the academic years. During the middle of first semester of the academic year, early registration is held for courses to be taken during the second semester. Similarly,

in the middle of second semester, students early-register for the following summer session and also for the first semester of the next academic year. Early registration is required for all enrolled students who intend to continue their studies at the department during the following academic terms. Students early-registered for a particular semester are also required to register formally on the scheduled registration day for that semester.

Formal registration is held at the beginning of first and second semester and summer session as per the academic calendar. Each student must be physical present and should register himself.

Late registration is held for students who have not completed the formal registration process on the fixed date. Such students may register late during the period specified in the academic calendar.

Students perform their early registration and confirmation on-line through the 'Dean of Admission and Registration' (DAR) website (http://regweb.kfupm.edu.sa). Students are also permitted to make necessary registration changes directly on-line. It is the responsibility of students to ensure that requirements for both pre-requisite and co-requisite for each registered course are met. All faculty members and active students can access the DAR website using their individual identity numbers and passwords. The use of on-line registration in the last two years has substantially reduced the time and effort spent in the registration process.

The registration process and its control are conducted on line through the following web pages of DAR website.

Registration Information Web page
This web page provides all necessary information to guide students in conducting the registration. The registration instructions for advisors are also provided. The web-page also provides course schedule, timing and location of classes, steps for adding/dropping courses and section changing.

Student Web Page
Through this web page, students themselves carry out their registration. Each student can also view his advisor's name, degree plan, academic record, registered courses, registration violations (if any), mid-term warnings and final grades. The information on the page is continuously updated.

Faculty Web Page
Through this web page, faculty can view names of their advisees with all their academic records, degree plans and the active registered courses. This allows the advisors to monitor performance, and ensure that the advisee is closely following his degree plan. In addition, the instructor of each course submits the mid-term warning grades for low-performance students to the registrar through this page. Students as well as their advisors are then informed about these warnings. Based on these warnings, the advisor can then advise the student accordingly. The registrar office updates the advisee lists and degree plans every semester from the official transcripts of the students. The page also provides web PINs of the advisees of each faculty. The students collect these PINs from their respective advisors.

Chairman Web-Page
The Chairman monitors all the records of the students; courses offered for registration, number of students registered in each course, list of advisors and their advisees. He can also view the mid-term warnings and the confirmed final grades submitted by the instructors. The on-line information of student registration provides ease in controlling the registration process such as opening and closing courses/sections and changing the size of various sections.

Academic Violations
During the early registration and formal registration, students who registered courses without satisfying the pre-requisite and co-requisite requirements receive a warning to replace the courses, which otherwise would be dropped.

Student Course Load
For students with a good academic standing status, the minimum course load is 12 credit hours during a regular semester (1 credit hour in summer session), provided that the total number of credit hours registered by a student in any two consecutive regular semesters is not less than 28. This condition is relaxed in the last semester before graduation. The maximum course load is 19 credit hours in regular semester and 8 credit hours in summer session. A student is permitted to register for 21 credit hours in a regular semester with the approval of the department chairman, provided that the student has maintained a minimum cumulative GPA of 3.00 out of 4.00 in all work undertaken during the preceding terms in which he earned his last 28 credit hours.

For students not on good status (i.e. warning/probation), the minimum and maximum course load during regular semester is 12 and 13 credit hours respectively, while for summer session the upper and lower limit is 7 credit hours.

Students who have early-registered in more than 13 credit hours and their academic status are not on good standing have to drop course(s) to bring the course load within the prescribed limit. Otherwise, their course(s) would be dropped after the last day of adding.

For students who are promoted to freshman level and whose cumulative GPA is less than 2.0 in the preparatory year program, their course load should not exceed 13 credit hours.

5.4 Recruiting Process

Standard 5-3: The process of recruiting and retaining highly qualified faculty members must be in place and clearly documented. Also processes and procedures for faculty evaluation, promotion must be consistent with the institution mission statement. These processes must be periodically evaluated to ensure that it meets its objectives.

The regulating policy for faculty recruitment, selection, and mentoring described below are observed for all the applications that are reviewed by the concerned committees in the department. Faculty appointments are generally made from candidates of outstanding technical competence and on the basis of demonstrated achievement in teaching, research and industrial experience. The recruitment procedure is normally applied to all faculty positions that include professorial ranks, instructors, and lecturers.

5.4.1 Professorial rank faculty and lecturers

The procedure for recruiting new professorial rank faculty and lecturers is described below:

1. Available faculty openings for professorial rank faculty members and lecturers are advertised through university and departmental web pages as well as through local and professional international journals. The applicants are requested to provide complete resumes and application forms, along with photocopies of official transcripts/degrees, list of publications, especially those published in refereed professional journals, and references with their complete addresses. In addition, they are asked to submit statements about their research, scholarly interests and their teaching experience.
2. The COE Faculty Search Committee reviews application files for professorial rank, instructor, and lecturer positions. The application files are reviewed on the basis of the applicant's qualification and his demonstrated achievements in teaching, research, and other professional experiences and skills. The committee forwards its recommendations to the COE chairman.
3. The COE Chairman in consultation with the Dean of College of Computer Science and Engineering, and based on the need of the department, recommends to recruit a new faculty or a replacement for a faculty position. The requests of recruitment are submitted to the Vice Rector for Academic Affairs who advises the Dean of the Faculty and Personnel Affairs to complete the recruitment process. The recommended application files along with the proposed academic ranks, salary ranges, and teaching responsibilities are then forwarded to the Rector for final approval. A university representative arranges personal interviews with the applicants in their locations. The interview reports are sent to the Chairman and the final selection of new recruitments is sent to the Dean of Faculty and Personnel Affairs for approval. The selection methods are based on the expectations of the applicant and the need of the department.

5.4.2 Faculty evaluation

Each faculty member is evaluated annually on his performance in teaching, research and other university services. These evaluations are based on the teaching performances, self-evaluation, and the chairman's evaluation. The teaching evaluation is based on the students' input and is conducted during the last few weeks of every semester for all the courses offered in the department. The chairman appoints research/graduate assistants to carry out this activity. At the end of the second semester, faculty members are requested to fill out their self-evaluation forms. Once the teaching evaluations and self evaluations are reviewed by the Chairman, he forwards them along with his input to the Dean of College of Computer Science and Engineering, which are then forwarded to the Dean of Faculty and Personnel Affairs. Following this, the Faculty Affairs Committee, a standing committee of the university appointed each year and chaired by the Dean of Faculty and Personnel Affairs, reviews and finalizes the faculty evaluations. The annual performance evaluation of each faculty member is sent directly to him every academic year.

5.4.3 Faculty benefits

The University realizes that maintaining high standards and continuous improvement of quality of teaching, research, and other services is directly associated with the benefits, incentives, and awards granted to the faculty with their development and achievements. The result of this policy is clearly reflected by the progress observed in teaching and level of the

program graduates, increased rate of publications in reputed journals and conferences, in addition to the professional satisfaction level among faculty members. The policy has resulted in a stable educational environment and ensured the continued teaching competence and professional growth of the faculty. The major benefits, incentives and awards offered to the faculty which contribute in retaining excellent faculty members, include the following:

- Competitive salaries based on qualifications and experience.
- Free furnished housing on-campus.
- Two months annual vacation with pay eligible after completion of 10 months of academic duty.
- A local transportation allowance provided according to the faculty rank, up to SR 7,200 per year.
- Prepaid round-trip air tickets up to a maximum of four tickets for the travel of the faculty and his dependents to the official point of origin.
- Educational assistance grants with local tuition fees of maximum total amount of SR 25,000 for school-age dependent children.
- A termination-of-service benefit equivalent to one month of annual base salary for completion of each full year of service, for a ceiled sum of SR 100,000.
- Increment in salaries based on the ratings of the faculty performance each year.
- Instituting the policy of annual excellence awards in teaching, research, and services.
- Availability of University-funded research in the forms of grants and released time.
- Encouragement of faculty to author textbooks by providing financial grants.
- Availability of a sabbatical leave program. A faculty member is eligible for a sabbatical leave after completion of 5 years of full academic service at KFUPM.
- Participation in contractual research projects funded by external clients.
- Facility in offering and organizing short courses.
- Support to attend one local and one international conference each year by providing per diem and registration fees based on a conference paper presentation or published paper in a refereed journal.

Some benefits mentioned above (e.g. free on-campus housing, repatriation tickets, etc.) are exclusively for expatriate faculty members. The salary scale and benefits of Saudi faculty are according to the Civil Service Regulations.

5.4.4 Faculty promotion

The procedure implemented in the department for faculty promotion follows precisely the University regulations. The University policies and regulations regarding faculty promotion are described in detail in the KFUPM booklet “Faculty Promotion, Regulations, and Guidelines, September 2000”.

5.5 Teaching and delivery of course material

Standard 5-4: The process and procedures used to ensure that teaching and delivery of course material to the students emphasizes active learning and on meeting the course learning outcomes. The process must be periodically evaluated to ensure that it meets its objectives.

In order achieve excellence in teaching and learning, evaluation and process control of these two factors are conducted regularly. Moreover, the department puts a strong emphasis on

utilizing the current modem technologies such as multimedia, audio-visual facilities, computer animations, and models by instructors in order to enhance the quality of course material delivery.

Processes and procedures used to ensure that teaching and delivery of course material are effective and focus on student learning are conducted through implementing the following measures and responsibilities.

a) Chairman's role

In each semester, the Chairman prepares the teaching assignment and course schedule for the following semester. At the beginning of each semester, he approves the proposed faculty teaching assignments after making the necessary adjustments. Furthermore, to ensure that the various teaching functions are conducted smoothly with the required standard and quality, he appoints coordinators to be in charge of these functions. The appointed coordinators include course coordinators for multiple-section courses, coop program coordinator, summer training coordinator, senior design coordinator, and seminar coordinator.

The Chairman also appoints graders for homework assignment, and advisors for all the students in the program, in addition to the department standing committees and liaisons. Each faculty member is assigned a teaching load while taking into consideration other administrative tasks assigned to him. The clear link between teaching activities and faculty teaching evaluations by students provides an effective mean to adjust the teaching assignment and hence monitor and improve teaching quality. At the end of the semester, before approving the final grades, the Chairman requests the coordinator's input (for multiple-section courses only). These final grades are then reviewed and discussed with the instructor to ensure that they are aligned with student performance. The result of Grade Point Average (GPA) of each course is closely analyzed and compared with established averages for the course and instructor performance.

b) Teaching assignment

Each semester, the Chairman prepares faculty-teaching assignments. Usually instructors are carefully assigned to courses in which they have experience, knowledge, and strength. The committee decides which courses to be offered, the elective courses based on the student needs in each area, number of sections for each course in accordance with the number of students in each level and their needs. Number of students per section is limited to 25 in lectures and 15 in laboratory sessions.

c) Coordination for multi-section lecture courses

For courses with multiple sections, a coordinator (generally an experienced faculty member) is selected by the Chairman. The main duties of the course coordinator are to ensure that:

- All sections strictly follow the course syllabus and all material is uniformly covered in all sections.
- The instructional materials are selected based on quality and appropriateness to the course objectives and assigned textbook.

d) Coordination for multi-section laboratory sessions

As with the lectures, the Chairman also appoints coordinators for multi laboratory sessions each semester. The main duties of the coordinators are to ensure that:

- All assigned experiments in the syllabus are conducted as scheduled.
- Wherever applicable, the experiments are streamlined with course lectures.

- Grades of students' reports are submitted to respective lecture instructors.
- Lab manuals and handouts are well prepared and readily available.
- Experimental setups and facilities are properly arranged.
- At the end of each semester, lab grades are available to each lecture instructor of the course before the final exams.

e) Instructors

On completion of a course, instructors are required to prepare a course file for the course they have taught and submit the same to the Chairman. The main purpose of this process is that other instructors can consult and utilize these course files to improve the quality of teaching by introducing new concepts and subjects (after the approval of the department). Moreover, teaching performance evaluations results are used to serve and guide instructors to enhance their teaching proficiency.

f) Course files

A course file contains the documentation of course syllabus, names of students and their grades, copies of all quizzes and exams, homework assignments, copies of term projects, copies of the highest, average, and lowest graded major and final exams, as well as their solutions. The course files are kept in the department as a reference.

g) Summer Training Coordinator

The summer training coordinator is responsible for handling and documenting all records of students participating in the summer training program. The coordinator ensures that all the summer training requirements have been satisfied before the grades are assigned. He also coordinates the process of evaluating the students' final reports and oral presentations with the examining committees.

h) Coop Coordinator

All the records of students participating in coop program and their progress are handled and documented by the coop coordinator. The coordinator ensures that all the coop requirements have been satisfied before he assigns the grades. He processes the progress reports and company evaluations of the students and arranges their oral presentations for examining committees.

i) Senior design project coordinator

The senior design coordinator assigns the topics of senior design projects every semester for the general section of the course (there are some specific sections of the course where a single instructor offers, assigns, and evaluates the student generally by himself, in which cases the coordinator has no role to play). The projects for general section are normally proposed by the COE faculty and occasionally proposed by the industry. The coordinator keeps track of all students' records and monitors their progress. The coordinator ensures that all the senior design project requirements have been satisfied before reporting the final grades. He also coordinates the students' oral presentations with the exam committees.

j) Seminar coordinator

In order to enhance knowledge of faculty members' as well as of mature students and thus enrich the academic environment, seminars are generally presented every week. The speakers are either from the COE faculty, COE graduate students, or invited from industry or from other academic institutions.

k) Student advising
Every student has an academic advisor. The role of the advisor is to guide his advisees in selecting the appropriate courses according to their degree plans, and monitor their learning performance through midterm warnings and final grades.

l) Curriculum and course syllabus
Each instructor distributes a copy of the detailed syllabus that contains the course title, textbook, reference books, sequential coverage of the material lecture by lecture, schedule of examinations, grading scheme, attendance policy and other important information.

m) Office hours
Faculty members are supposed to allocate a significant amount of time each week outside the class for meeting their students and advisees to answer any questions they have or clarify any doubts about a certain topic in the course. The schedule of the office hours is posted on the instructor's office (and on the instructor's official web-page). A copy is also provided to the department.

n) Examinations and grade
Academic performance of students is evaluated based on certain types of exams. These include homework assignments, quizzes, written examinations, seminars, term projects, laboratory or fieldwork, and final exams, as applicable to the nature of the course. Except for the final exam, the instructors themselves schedule all the examinations. The final examinations are mandatory for all courses and are scheduled by the Deanship of Admission and Registration. The duration of the written final examinations can be up to three hours.

o) Textbooks
The adopted textbooks for teaching are frequently evaluated by the course coordinators and instructors. New textbooks, which may be proposed either as a replacement or as an addition for a course are first evaluated by the Textbook Committee and recommended by the Department Council before the university's approval can be obtained.

5.6 Graduation Process

Standard 5-5: The process that ensures that graduates have completed the requirements of the program must be based on standards, effective procedures and clearly documented. This process must be periodically evaluated to ensure that it meets its objectives.

At the end of each semester, a list of candidates for graduation along with their degree audits and transcripts are sent to the department. Each of the graduating students, after consultation with his academic advisor, fills out a graduation declaration form. The Chairman reviews the student records and ensures that all requirements for graduation have been met. The Chairman then signs the graduation forms and sends them to the Registrar. The Registrar makes a final check and approves the graduation. Apart from this, the COE department has two different forms/check lists for coop & non-coop students to check fulfillment of graduation requirements.

The requirements of Non-coop students to qualify for graduation are:

1. Completion of all specified and elective courses according the degree plan of the program (132 credit hours minimum) with a cumulative GPA of 2.00 or better;
2. Achievement of a GPA of 2.00 or better for all courses offered by and taken in the student's major department; and
3. Spending eight weeks in one summer (after either the third or fourth year) working in the industry.

For the Coop students, the requirements for graduation are:

1. Completion of all specified and elective courses according to the degree plan of the program (132 credit hours minimum) with a cumulative GPA of 2.00 or better.
2. Achievement of a GPA of 2.00 or better for all courses offered by and taken in the student's major department; and
3. Successful completion of a 28-week cooperative program in the industry after the third year.

Section 6: Faculty

6.1 Introduction

Full time COE faculty is committed to the program development and course coverage in addition to maintaining continuity and stability of academic standards. The interest and qualifications of department faculty members are sufficient to plan, teach, modify and update all offered COE courses, and curriculum. The COE faculty accumulatively presents an impressive level of competence in their respective areas of specialty through their academic and industrial work experiences.

6.2 Full-Time Faculty

Standard 6-1: Faculty Qualifications and Numbers
There must be enough full-time faculty members committed to the program to provide adequate coverage of areas/courses and maintain continuity and stability. The interests and qualifications of all faculty members must be sufficient. All faculty members must have a level of competence that would normally be obtained through graduate work in the discipline. The majority of the faculty must hold a Ph.D. in the discipline.

The following table indicates the various program areas and the number of faculty in each area.

Table 3: Program areas and number of faculty in each area

Program areas	Courses offered in each area and the average number of sections per year (U)	(G)	(students/section)	Number of faculty members in each area	Number of faculty with PhD
Computer Networks	5.75	3	38	9.5	5
Computer Architecture	4.75	2	33	6.5	4
Design Automation	4.75	3	26	7.5	5.5
Computer Applications	3.75	2	15	2.5	1.5
Total	19	10		26	16

(U) = undergraduate (G) = graduate

The data in the above table was obtained using the 2001-2002 COE annual report. The faculty interests were distributed over the four areas of the department as well as the courses. The number of sections was obtained by dividing the total number of students in a given course by assumed average 'students per course' strength of twenty.

The COE department currently has twenty-six faculty members of which sixteen have doctorate degrees (61.5%). The distribution of faculty ranks is as follows: there are presently four professors, one associate professor, eleven assistant professors and ten lecturers.

There are four major areas in the COE department. These are:

(1) Computer Networks and data communications,
(2) Computer Architecture,
(3) VLSI and Digital Systems Design, and
(4) Computer Applications.

For each area the above table shows the number of undergraduate courses (U), graduate courses (G), total faculty (F), and faculty with Ph.D. degree (PhD).

The faculty analysis (Table 3) describes the strengths of COE faculty and addresses faculty size and qualifications. Faculty CVs are also included in Appendix B. The number of COE faculty and their background is currently adequate to meet the quality standards that expected for the program. The ratio of the number of taught course sections to number of faculty is 4.3 per year or 2.15 per semester. This shows the adequacy of faculty size for the offered program.

For 2002, the student--faculty-ratio in the COE department was approximately 30:1 for all students. However, the same ratio is 0.8:1 for graduate students. Although the number of COE faculty members is adequate to meet current needs, the multidisciplinary nature of the COE field works against having much depth in any particular discipline. Consequently, strong COE undergraduate student interest in a particular discipline can place a disproportionate burden on individual faculty members in that area. Given this situation and the increased appeal of COE among undergraduates, we anticipate the need to add new faculty as the undergraduate COE program continues to grow.

COE faculty members have a wide range of responsibilities (teaching and other student-faculty interaction, advising and counseling, service, professional development, and interactions with industry) that comprise their overall academic effort. The average teaching load in the COE department is 4.3 course sections per year. Each section in a semester is from a different course. On average, the COE faculty has an excellent record of scholarship and has been successful in conducting funded research or proposing research projects. In 2003 the COE faculty submitted 22 research projects.

The academic-advising load averages about 30 students (both undergraduate and graduate) per COE faculty member. Each faculty is supervising an average of two senior design projects per year. Finally, in addition to serving their profession, each COE faculty member participates in departmental, college, and university services.

Faculty members have their complete resumes included in Appendix B.

6.3 Faculty Development

Standard 6-2: Faculty Scholarly Activities
All faculty members must remain current in the discipline and sufficient time must be provided for scholarly activities and professional development. Also, effective programs for faculty development must be in place.

The COE faculty is deemed current and competent in their discipline due to the following factors:

a. Education: Most faculty members have PhD degrees.
b. Diversity of backgrounds: There is good diversity in aspects such as previous experience, theoretical or practical orientation, age, and industrial experience.
c. Engineering experience: About 50% of our faculty has industrial experience. This has been extremely helpful in bringing the "real world" of engineering into the classroom and project environments.
d. Teaching experience: The range of experience in the COE specialization areas is wide enough. In addition, there is some depth in the areas of Design Automation, Computer Architecture, and Computer Networks.
e. Ability to communicate: COE faculty members are all effective communicators, as demonstrated by their teaching evaluations and their strong inter-personal skills necessary to stimulate and motivate student learning.
f. Enthusiasm for developing more effective programs: This is demonstrated by the extensive revision of the undergraduate curriculum in 2003 to remove redundancies and to accommodate a wider range of student interests.
g. Scholarship: In 2003, COE faculty members had a total of 27 peer-reviewed publications, of which seven were journal articles and twenty were conference papers. Many others are in preparation. The intensity of scholarly activity among faculty varies widely; the most significant factor is that essentially all faculty members are engaged in significant scholarship and all are engaged in imparting undergraduate education.

Full time COE faculty members have sufficient time for scholarly and professional development due to their interest and the current faculty load. On the average each faculty has: (1) two courses per semester as teaching load, (2) serve on four committees, (3) two Co-Op students supervision per semester, (4) 30 students per semester as academic advising. In spite of the above, the faculty has an average of in-progress seven research projects. These grants provide faculty with funds for release time and research support. They publish on the average 12 journal papers and 23 conference papers in refereed journals and conferences per year. In 2003, the COE faculty submitted 22 research proposals.

KFUPM offers its faculty many opportunities for professional development. The university provides faculty members with funds for travel to national, regional, and international conferences to present scholarly and creative work. Other supports are available for book writing. The university awards outstanding faculty performance through the (1) Excellence in Teaching Award, (2) Excellence in Research Award, and (3) Excellence in Advising Award. The college also has similar awards. A number of research and teaching centers have been established on campus to foster academic growth and development as well as community involvement. The Research Institute provides an interface for proposing and managing contractual research. The Deanship of Academic Development (DAD) organizes short courses for faculty to promote their teaching qualifications and advances in curriculum development. Faculty also has the opportunity to apply for university-funded one-semester sabbatical leave of absence.

The university research committee handles all aspects of research proposal submission, peer evaluation, reporting, and monitoring. It establishes the policy for conducting and supporting research. It also regulates the process of faculty promotion to professorial ranks and encourages faculty to apply for promotion. The university research policy is revised every year to accommodate new incentives for faculty to develop original research, publish in well-reputed journals and conferences, and for book writing. There are remarkable opportunities to

carry out funded research. The university faculty promotion guidelines follow the international standard in the education profession. Faculty promotion is based on peer evaluation done by three external reviewers. There are several mechanisms in place for faculty to contribute to the formulation of policies, practices, and governance at all levels such as through department, college and university committees.

6.4 Faculty Motivation

Standard 6-3: Faculty Motivation and Job Satisfaction

Faculty members should be motivated and have job satisfaction to excel in their profession.

Although not sufficient, some programs and processes are in place for faculty motivation. These include the following.

- Reasonable non-taxable basic salary and transportation allowance for 12-month per year.
- Termination allowance (one month salary for each year served up to a maximum sum of SR 100,000)
- A free furnished housing on campus with free utilities and maintenance.
- Free limited medical care at the university clinic.
- A sum of SR 25,000 Educational Assistance Grant for faculty children in schools.
- A maximum of four airline tickets for faculty member and family on the national air carrier.
- Good research opportunities and environment.

Faculty input through a survey (Appendix E) on programs for faculty motivation and job satisfaction was carried out. Responses were collected from nine faculty members. These are summarized below:

Criteria	Evaluation					Main Causes & How to Rectify
	4	3	2	1	0	
Do you think the salary package offered attract high quality faculty	0	0	3	4	2	▪ Offered salary is not competitive. ▪ Increase offered salary to attract more qualified faculty
Do you think the faculty salary increase retains high quality faculty	0	0	3	2	4	▪ Lack of fairness in salary compensation. ▪ Adjust salary depending on faculty teaching and research performance. Improve job security.
Do you think the financial system encourages excellence in teaching	0	1	3	1	4	▪ Faculty teaching performance does not reflect on salary. ▪ Adjust salary for winners of the teaching award. Adjust salary to reflect performance in teaching.
Do you think the financial system encourages excellence in research	0	3	2	3	1	▪ Faculty research performance does not reflect on salary. ▪ Adjust salary for winners of the research award. Adjust salary to reflect performance in research.
Do you think secretarial support is adequate	0	0	0	3	6	▪ Lack of secretarial support. ▪ Hire one qualified secretary or one administrative staff dedicated to faculty support.
Do you think technical staff are adequate	1	1	2	2	3	▪ Weak/insufficient technical staff. ▪ Hire one qualified technical staff dedicated to faculty support
Do you think office equipment is adequate	0	2	3	4	0	▪ Weak/insufficient teaching facilities and equipment. Insufficient office space. ▪ Provide each faculty member teaching equipment (printer, scanner), new departmental printer and copier. Obtain more office space.
4: strongly agree	**3: agree**	**2: neutral**		**1: disagree**	**0: strongly disagree**	

In the following we show the average rating given by the faculty to each of the corresponding questions:

- C for “Your mix of research, teaching and community service”
- C-B for “The intellectual stimulation of your work”
- B+ for “Type of teaching/research you currently do”
- B+ for “Your interaction with students”.
- C+ for “Cooperation you receive from colleagues”
- C for “The mentoring available to you”
- C- for “Administrative support from the department”
- C+ for “Providing clarity about the faculty promotion process”
- C+ for “ Your prospects for advancement and progress through ranks”
- D for “Salary and compensation package”
- C+ for “ Job security and stability at the department”
- C+ for “Amount of time you have for yourself and family”
- C-B for “The over all climate at the department”

To the question “What are the best programs/factors currently available in your department that enhance your motivation and job satisfaction?” Some of the faculty answers were:

- None exist
- A college-wide data base system is being developed to reduce faculty administrative load
- The faculty in the department constitutes a nice group. Also, research support from the university is very good.
- Teaching assignments are according to our preferences
- Availability of funded research

To the question “Suggest programs/factors that could improve your motivation and job satisfaction?” Some of the faculty answers were:

- Fairer distribution of administrative duties and senior projects, fairer distribution of graduate students, fairer distribution of graduate courses.
- Hire qualified administrative staff to relieve faculty from clerical/mechanical work to reduce faculty involvement only for technical aspects.
- Reduce administrative work and bureaucracy. Improve financial compensation packages and job security.
- Allow more time for junior faculty member to focus on research and teaching instead of administrative jobs.
- The most important factor that needs major improvement is that the evaluation of a faculty does not reflect on his salary. Whether a faculty member gets a distinguished evaluation or not, the pay structure remains the same.. This kills the motivation towards achieving excellence. There should be a clear system known to everyone, which related salary and compensation packages as per performance. Currently, salary increase for all faculty members is around 2% every two years, regardless of the performance, which is completely unsatisfactory.
- Reduction of the administrative work. Choosing the preferred convenient time and day for teaching instead of having it assigned. Motivating team research rather than individual efforts. Providing the needed teaching equipment at each instructor’s office e.g. printer, scanner.
- Improve administrative support. Carry out action to increase the number of graduate students to improve overall quality and research. Provide research/teaching assistants.

Mix of research, Teaching, and community service	# of responses	Very satisfied (VS)	Satisfied (S)	Neutral (N)	Unsatisfied (US)	Very unsatisfied (VUS)	Average
Intellectual stimulation of work	14	0	6	6	1	1	Between N and S-
Type of teaching/research	14	0	9	5	1	0	Between N+ and S
Interaction with students	14	3	5	6	0	0	Between N+ and S
Cooperation & Interaction with Colleagues	14	1	6	7	0	0	Between N and S
Availability of mentoring	14	0	4	8	2	0	Between N+ and S
Department Admin support	14	3	2	3	4	2	S
Advancement & progress through ranks	14	0	3	4	5	2	Between US and S
Salary & Compensation	14	0	0	2	7	5	US
Job security	14	0	4	6	3	1	N
Amount of time with family	14	0	0	3	5	6	Between US and VUS
Overall Climate	14	0	6	8	0	0	Between N and S-

Section 7: Institutional Facilities

Standard 7-1: New Trends in Learning
The institution must have the infrastructure to support new trends in learning, including e-learning.

7.1 Introduction

The COE faculty has access to computers, Internet connections, and a significant repository of Microsoft-related software. The technical support personnel are readily accessible and work hard to troubleshoot and fix problems related with software and hardware. Printing and copying facilities are also available in the Department. All of the above factors help in implementing modern trends in learning, including eLearning.

7.2 Infrastructure

The department faculty indicated need for the following resources, which would enrich the academic environment, increase productivity and enhance student learning.

- Opportunity to audit/take online courses at international institutions and universities, as part of a continuing education strategy
- Office/home connections to a high-speed broadband network to allow fast access to global electronic resources

Up-to-date computers possibly upgraded every two years. Also newer and powerful Sun workstations are required for complex and CPU-intensive tasks as well as support the growing Unix environment.

Current versions of various common support software. Presently there is a lack of productivity software such as the Adobe suite of products.

- It is felt that the software is overly Microsoft-centered. There need to be wider range of alternatives in terms of software and operating systems. (Such as GNU software, various Linux distributions, etc) (Such as Linux, GNU, X Window etc.).
- Spacious meeting rooms/conference rooms located near to faculty offices and open 24 hours.
- Personnel support for faculty for developing multimedia content. There should be a dedicated support group available to develop multimedia and graphical animations for faculty. This could also be at the university level.
- Better printing/photocopying facilities.
- Stationary equipment such as a paper shredder and paper recycle bins are needed in the department.

Standard 7-2: Library quality
The library must possess an up-to-date technical collection relevant to the program and must be adequately staffed with professional personnel.

7.3 Library

The KFUPM main library is well shelved with contemporary books and references. There are over 300,000 monographs and close to 500,000 microfiche pieces. In addition, the library has an efficient catalog search facility for looking up publication titles in its database.

Furthermore, the library also provides electronic search and retrieve facilities to access some of the world-class databases for scientific journals and conference such as IEEE/IEE and ACM. An excellent feature is the prompt accommodation of book purchase requests by the library. Finally, current library support is comprised of the following services: library website, over-the-Internet access to electronic databases, audio-visual support, online catalog search, and interlibrary loan.

The faculty reported the following views and observations about the Library:

- The online catalog should be improved as it returns incomplete results against keyword searches
- More electronic databases and e-books should be added (Such as books 24x7 and Compendex)
- Multiple copies of textbooks and other books, which may be in demand, should be kept.
- The on-reserve textbook loan period should be increased substantially, or multiple copies should be available on regular stacks.
- Better book recall procedures are required.
- Faculty should be able to order and return books from their offices

Standard 7-3: Classrooms and Office Adequacy
Classrooms must be adequately equipped and offices must be adequate to enable faculty to carry out their responsibilities.

7.4 Classrooms and faculty Offices

Presently, all classes are equipped with network connected computers and in-focus projectors. They are primarily used to deliver electronic class notes and perform in-class demos and presentations. For these computers, commonly used Microsoft applications (such as Microsoft Office) are installed. Other more specific software/tools can be installed on request.

Regarding these classroom facilities, the faculty had following observations:

- Classroom computers need to be upgraded as most are too slow and require excessive repairs.

- Current software is often not installed on classroom computers. All such software should be installed and faculty should be queried regarding any specific needs.
- Whiteboards/markers are preferable over blackboards, and hence more of these should be installed in the classrooms.
- Easily accessible controls for projectors are needed.
- Class size should be restricted to 15-20 students per session.
- Larger classrooms to keep pace as student population increases.

Most of the faculty offices are housed in buildings 22 and 23. Most of the offices have adequate space, lighting and air conditioning. Furniture and equipments in faculty offices can also be considered adequate in most of the cases. Access to equipment such as general-purpose printers/photocopier, CD writer, scanner, is also available in the department 'faculty resources' room. Two Unix workstations are also available.

Regarding office and related facilities, the faculty had following observations:

- Every faculty member should have a separate, unshared office with enough room for holding discussions with up to two to three students,
- Printers should be provided in each office,
- Faculty office furniture needs to be replaced/upgraded.

Section 8: Institutional Support

8.1 Introduction

In general, KFUPM has been successful in securing sufficient support and financial resources to attract excellent faculty members and to provide all possible means to maintain competence in teaching and scholarly work. However a barely sufficient number of high quality graduate students, research assistants, and PhD students are enrolled. Hence, it has always been felt by the faculty that more effort should be spent in recruiting qualified and skilled students for these positions. Additionally, there is a need for increasing the financial resources allocated to acquire and maintain library holdings, laboratories, and computing facilities.

8.2 Support and Financial Resources

Standard 8-1: Support and Financial Resources
There must be sufficient support and financial resources to attract and retain high quality faculty and provide the means for them to maintain competence as teachers and scholars.

Some factors that contribute to the recruitment and retaining high quality faculty members are summarized below:

- Supporting faculty members to attend international conferences (Each faculty can attend two conferences a year based on paper presentations & published papers)
- Providing opportunities for funded research projects (Each faculty can be funded in two research projects by the university. He can also be funded for other projects through research organizations, e.g. KACST).
- Providing limited period (6 months for every 5 years services) sabbatical leaves for research work.

However, faculty members made the following observations:

- Salary package and benefits should be improved.
- Salary increase needs to be based on faculty performance. Currently, it is almost standard for most faculty members. (Around 2% every - two years).
- Sabbatical leaves should be improved in terms of the granted period (one year instead of six months)
- Increase and improve the quality of secretarial support staff.
- Increase and improve the quality of technical support staff.
- Improve the maintenance of laboratories and office equipment.

8.3 Graduate Students and Research Assistants

Standard 8-2: Number and Quality of GAs, RAs, and PhD Students
There must be an adequate number of skilled high-quality graduate students, research assistants and PhD students.

Table 4 shows the number of graduate students, research assistants, graduate assistants, and PhD candidate during the last three years.

Table 4: Number of Graduate Students during last three years

	1999-00	2000-01	2002-03
MS	11	10	7
RAs & GAs	11	20	13
PHD	0	02	01
Graduate Student/Faculty Ratio	2.0	2.0	2.0

As seen from this table, more graduate students need to be recruited to support the graduate program in the department and to help faculty in research.

8.4 Financial Resources

Standard 8-3: Financial Support for Library and Computing Facilities
Financial resources must be provided to acquire and maintain library holdings, laboratories and computing facilities.

Library has following types of resources:

1. Books.
2. Journals.
3. Electronic resources including microfilms, microfiche, and digital libraries.

Collections in multiple categories are in the following table (Table 5):

Table 5: Resources - Collection/Holdings as of September 2000

Item	Quantity
Monographs (books)	294,471
Periodicals (bound volumes)	65,453
Full-text journal titles	825
Microfilms	37,522
Microfiche	486,923
Films	2,367
Other media	23,713
Current periodical titles on subscription	1,084
Serial title on standing order	241
Total collection	911,288

Library's electronics resources include:

1. Electronic databases that provide direct access to IEEE and ACM digital libraries to download full-text of their publications.
2. Electronic journals

3. Multimedia encyclopedias including Encyclopedia Britannica.
4. Web resources directory with useful links to various organizations

The library also provides excellent support to faculty for ordering books and that may be beneficial to research and academics.

Laboratories & Computing Facilities

Financial resources for laboratories and computing facilities are excellent. Labs are always upgraded with up-to-date equipment and tools. However, human resources in terms of lab engineers and technicians need improvement through training and skill-building programs. Building resources also need to be augmented, as more space is needed for the establishment of research labs. Most of the labs that are available currently are meant specifically for teaching.

The following is the list of equipment available for COE labs (Table 6):

Table 6: Equipments available for COE Labs

Course	Lab	Computing equipment
COE-200	22/333-1	17 Dell Pentium II PCs.
COE-205		Not conducted in a COE Lab.
Robotics Lab	22-339	3 Archie Pentium III PCs, 1 Dell Pentium II PC, 1 LaserJet Printer HP 8150N, 1 SUN Workstation (SunBlade 150).
COE-305	22-340B	1 Micron Pentium II PC.
COE 400	22-347B	9 Pentium II LEO PCs, 3 Pentium II DELL PCs, 1 LaserJet Printer HP 2200D.
COE 442	22-347A	24 IBM Pentium IV 2GHz. PCs. 1 Compaq Pentium I Dual Processor Server, 1 LaserJet Printer HP 5N.

The following is the list of computing facilities available in the college for students:

1. 22-413, Unix lab
   - 16 Ultra SPARC 10/Solaris 7
   - 6 MAC
   - 4 Linux/Pentium
   - 1 laser printer

2. 22-410, 22-335, Ms Windows lab
   - 35 Pentium IV machines in each lab
   - One laser printer in each lab

3. 23-017, 23-018, Ms Windows lab
   - 30+ Pentium III machines in each lab
   - One Laser printer for two labs

4. 22-333, MS Windows lab
   - 17 Pentium III
   - One laser printer
   - One scanner, and CD-Writer for students

5. 22-418, MS Windows lab
   - 22 Pentium III
   - One laser printer

6. 22-343, MS Windows lab
   - 10 Pentium II
   - One laser printer

Conclusion

Computer engineering is a discipline of much interest and demand exists in both Saudi Arabia and elsewhere. Currently, there is a critical shortage of computer professionals who can design and implement computer systems and networks. The Kingdom of Saudi Arabia has focused on computer technology and its utilization as one of the fundamental tools to modernize its industry and to cope up with advances in modern technology. Employment opportunities for qualified computer engineers are tremendous.

The Computer Engineering Department provides a program that develops the necessary skills and competence required to design and implement computer systems and networks. The COE curriculum emphasizes a number of areas such as, digital system architecture and design, microcomputer-based systems, integrated circuit technology, computer communication, and computer networks. In addition, sufficient emphasis is given to the study of computer science in order to provide a coherent view of computer systems and an understanding of the interdependencies of hardware and software components, their interfaces, and their co-design tradeoffs.

The current self-assessment process is conducted in order to highlight the points of strengths and otherwise weaknesses in the COE program. The exercise has been carried out in compliance with the criteria and standards provided by the Deanship of Academic Development at KFUPM.

The First Criterion addresses the program's mission, objectives and outcomes. Surveys from Graduating students and Faculty members were carried out which showed an overall satisfactory level. Most of the students proposed to increase the weight of the course projects. Additionally, many students suggested having separate course projects rather than the same project for all students. Most of the faculty members surveyed demanded a fair compensation package, a reduction in administrative work, an increase in the number of graduate students, and balanced teaching assignments. Surveys were sent to Employers and their feedback is awaited.

On the assessment of Second Criterion regarding curriculum design and organization, the analysis of linking courses to program outcomes showed that the curriculum is consistent and supports the documented objectives of the program. The program satisfies the ABET requirements completely. The ABET requirement for mathematics and basic sciences is 32 credits whereas the COE program at KFUPM has 35 credits. For Engineering Sciences, the ABET requirement is 32 credits while the Engineering Science component in COE program is 34 credits. ABET specifies a requirement of 16 credits for Engineering Design, while the COE curriculum provides 19 credits for this component. The ABET requirement for Humanities and Social Science courses is 16 credits whereas the COR curriculum provides 17 credits for breadth and depth in these courses. The COE program also satisfies the 'Major' credit hours requirements as specified by ABET. The ABET requirement is 42 'Major' credit hours out of which a minimum of 12 credit hours must be for 'Design'. The COE program has 61 Major credit hours out of which 20 credit hours are engineering design. Computers are utilized throughout the curriculum using numerous general and specialized software packages. Several courses involve term projects and require various computer-aided tools and simulators. The COE Department ensures the development of competence in oral

and written communications in the English language for its students through the following means: (i) English courses offered in the Preparatory Year Program (PYP). (ii) Three required English courses as part of the BS program, (iii) Most of the COE Elective and core courses require technical report writing and professional presentations, and (iv) A dedicated course COE 390, through which students are trained on how to make professional presentations.

The adequacy of laboratories and computing facilities is the essence of the third criterion. There are nine laboratories in the COE department. Most of the existing labs are self-sufficient for conducting the lab sessions of various courses as well as supporting faculty research. The Robotics Lab and Performance Engineering Labs are adequate for research purposes only. Safety regulations are posted at prominent places in all the labs. For all teaching labs, both instructors and students are provided with hard copies of the lab manuals and other documentation. Additional copies are also kept in the labs. Soft copies of some of these manuals are available and accessible through the COE department web page. The teaching labs are very adequate and compare favorably with those found in major reputable institutions. The research labs, however, are very inadequate. The department needs at least four more research labs. There is very limited lab support in terms of personnel. There is only one lab engineer/technician in the COE department who also acts as the only maintenance engineer in the CCSE College. He has additional duties towards the CCSE network technical administration. For the departmental labs to achieve their goals within the program objectives, adequate personnel support must be provided. This means that the number of lab engineers should be increased in addition to acquiring a general maintenance engineer/technician for all the labs. In general, the computing facilities are similar to those found in major reputable universities. One shortcoming in our computing support is the ability to setup networking in open areas outside computer labs (i.e. wireless networking). This would give the students unconstrained access to the intranet and other resources

The Fourth Criterion addresses students' support and guidance. One basic principle that governs our care and support measures for COE students, is the provision of the best possible academic advising. The COE Department has a dedicated "Student Guide" for its students which includes all required information about the curriculum, courses, prerequisite requirements, and template degree plans for both Coop and non-Coop students. The COE Student Guide is available to all students both online and as a paper document. The COE faculty members dedicate extra office hours during registration period for students' help and guidance. The department also holds a student-faculty gathering once every year during which students and faculty can exchange views about curriculum matters in a relaxed and friendly setting. All COE core courses are offered every term. In addition, required courses outside the department are usually offered every term. Elective courses are offered quite frequently and are dependent mostly on the interest of the students. Many efficient measures have been implemented to help ensure effective interaction between students and faculty. Classes are made of small groups averaging a maximum of 20 students per class. Students are required to attend their classes regularly and on time. More than 20% unexcused absences of a student in any course results in a "DN" (denial) grade. All multi-section courses are assigned a course coordinator to ensure reasonable uniformity in course material offering and grading. In addition, the Counseling and Advising Center (CAAC), offers a multitude of academic and non-academic services to the students at an individual or group level.

The fifth criterion relates to process control. The major functions of the program consist of student admission, student registration, faculty recruitment, teaching, and graduation. The

processes for performing these functions are documented and conducted in an organized manner. Evaluation of this process is performed every semester to ensure that its objectives are met. The process consists of well-defined procedures and steps executed at the university, college, and departmental levels. *Formal registration* is held at the beginning of first and second semester and summer session as per the academic calendar. Each student must be physically present and should register in person. Students perform their early registration and confirmation on-line through the 'Dean of Admission and Registration' (DAR) website (http://regweb.kfupm.edu.sa). Students are also permitted to make necessary registration changes directly on-line. The regulating policy for faculty recruitment, selection, and mentoring are observed for all the applications that are reviewed by the concerned committees in the department. The recruitment procedure is normally applied to all faculty positions that include professorial ranks, instructors, and lecturers. Each faculty member is evaluated annually on his performance in teaching, research and other university services. These evaluations are based on the teaching performances, self-evaluation, and the chairman's evaluation. The teaching evaluation is based on the students' input and is conducted during the last few weeks of every semester for all the courses offered in the department. The annual performance evaluation of each faculty member is sent directly to him every academic year. The department puts a strong emphasis on utilizing modern technologies such as multimedia, audio-visual facilities, computer animations, and models by instructors in order to enhance the quality of course material delivery. On completion of a course, instructors are required to prepare a course file for the course they have taught and submit the same to the COE Department Office. The main purpose of this process is that other instructors can consult and utilize these course files to improve the quality of teaching.

The sixth criterion relates to faculty. It is noted that the interest and qualifications of department faculty members are sufficient to plan, teach, modify and update all offered COE courses, and curriculum. The COE faculty accumulatively presents an impressive level of competence in their respective areas of specialty through their academic and industrial work experiences. The COE department currently has twenty-six faculty members of which sixteen have doctorate degrees (61.5%). The number of COE faculty and their background is currently adequate to meet the quality standards that are set for the program. However, strong COE undergraduate student interest in a particular discipline can place a disproportionate burden on individual faculty members in that area. Given this situation and the increased appeal of COE among undergraduates, we anticipate the need to add new faculty as the undergraduate COE program continues to grow. On average, the COE faculty has an excellent record of scholarship and has been successful in conducting funded research or proposing research projects. In 2003 the COE faculty submitted 22 research projects. A number of research and teaching centers have been established on campus to foster academic growth and development as well as community involvement. The Research Institute provides an interface for proposing and managing contractual research. The Deanship of Academic Development (DAD) organizes short courses for faculty to promote their teaching qualifications and advances in curriculum development. Expatriate faculty members also have the opportunity to apply for university-funded one-semester sabbatical leave of absence.

The institutional facilities and institutional support are the subjects of seventh and eighth criteria, respectively. The COE faculty and students have access to computers, Internet connections, and a significant repository of Microsoft-related software. Photocopying facilities are also available in the Department. The department faculty indicated the need for the opportunity to audit/take online courses at international institutions and universities, as part of a continuing education strategy. Better personnel support for troubleshooting the

problems in hardware and software was also demanded. The KFUPM main library is well shelved with contemporary books and references. There are over 300,000 monographs and close to 500,000 microfiche pieces. In addition, the library has an efficient catalog search facility for looking up publication titles in its database. Presently, all classes are equipped with network connected computers and in-focus projectors. They are primarily used to deliver electronic class notes and perform in-class demos and presentations. For these computers, commonly used Microsoft applications (such as Microsoft Office) are installed. Other more specific software/tools are usually installed upon request. In general, KFUPM has been successful in securing sufficient support and financial resources to attract excellent faculty members and to provide all possible means to maintain competence in teaching and scholarly work. However a barely sufficient number of high quality graduate students, research assistants, and PhD students are enrolled. Hence, it has always been felt by the faculty that more effort should be spent in recruiting qualified and skilled students for these positions. Additionally, there is a need for increasing the financial resources allocated to acquire and maintain library holdings, laboratories, and computing facilities.

References

1. ABET, Self Study Questionnaire for Review of Engineering Programs.

2. David, D. "Is There an Academic Audit In The Future: Reforming Quality Assurance in U.S. Higher Education" *Change*, pp. 35-41, July/August, 2000.

3. Diamond, R.M., *Designing & Assessing Courses & Curricula: A Practical Guide;* Jossey-Bass Inc. Publishers, Revised Edition, 1998.

4. El-Khawas, E. *Campus Trends*, Higher Education Panel Report No.85. Washington D.C.: American Council on Education, 1995.

5. Lusthaus, C., Adrien, Anderson, G., and Carden, F., *Enhancing Organizational Performance*; International Development Research Center, Ottawa, Canada, 1999.

6. Quality Assurance Agency, University of Nottingham, Continuation Audit, Analytical Account, November 1999.

7. Palomba, C. A and Banta T. B., *Assessment Essentials*, Jossey-Bass Inc. Publishers, 1999.S

8. The Task Force on Assessment and Program Improvement, at The University of Illinois, Urbana Champaign,http://www.oir.uiuc.edu/assessment/reports/taskforce_report.html, August 1997.

9. The University of Melbourne, Evaluation Cycle Reference Group, 2000.

10. Troy M., and Lowe P.A., Texas A & M University Assessment Manual, http://www.tamu.edu/marshome/assess/Manual.html