



Assessment Report
of the application by the
King Saud University, Riyadh,
College of Applied Medical Sciences,
on accreditation of
Bachelor Study Program
“Biomedical Technology - Instruments”
(Bachelor of Science)

Table of contents	Page
1. Introduction	3
2. General	5
3. Content issues	
3.1 Structure of the program and content requirements	7
3.2 Curriculum	10
3.3 Educational objectives	17
3.4 Labour market situation and employment opportunities	18
3.5 Access and admission requirements	18
3.6 Quality Assurance	19
4. Personnel and technical equipment	
4.1 Teaching Personnel	22
4.2 Equipment for Teaching and Research	23
5. Institutional Environment and Structural Conditions	23
6. Expert report	25
7. Decision of the Accreditation Commission	46

This report is confidential. Disclosure to third parties without the consent of the applicant institution or the office of the AHPGS is not allowed.

In order to render the document more legible, the AHPGS utilizes the masculine form for both masculine and feminine references.

1. Introduction

The Accreditation Agency for Study Programs in Health and Social Science (AHPGS) is an interdisciplinary, multiprofessional organisation. Its mission is to accredit Bachelor and Master study programs in the fields of health and social science, as well as in related domains. As an international organisation, it aims at bringing a valuable contribution to the academisation of the health and social fields by accrediting Bachelor and Master study programs. By implementing accreditation procedures, the AHPGS contributes to the improvement of the overall quality of teaching and learning. However, the higher education institutions remain responsible for fulfilling the quality assurance, too.

In the context of the current internationalization of higher education study programs, the AHPGS accredits international study programs and their compliance with general, internationally-acknowledged university standards. In such cases, the AHPGS also considers specific requirements formulated by the applicant higher-education institution.

In this context, the College of Applied Medical Sciences of the King Saud University, Riyadh, Saudi Arabia, has contracted the AHPGS for the accreditation of eight Bachelor study programs: "Biomedical Technology - Instruments", "Clinical Laboratory Sciences", "Clinical Nutrition", "Dental Hygiene", "Health Education", "Optometry", "Physical Therapy", "Radiological Sciences".

At a formal level, the accreditation process follows internationally-established steps: the Application is submitted by the university, the Review of the program by experts, the On-Site Visit and the Decision of the Accreditation Commission. The Accreditation Criteria considered are developed by the AHPGS in close accordance with the existing criteria and requirements valid in the Federal Republic of Germany and based on the "Standards and Guidelines for Quality Assurance in the European Higher Education Area", established by the European Association for Quality Assurance in Higher Education (ENQA).

In the Kingdom of Saudi Arabia, the national regulation in matters of higher education accreditation is established by the National Commission for Academic Accreditation & Assessment (NCAAA, www.ncaaa.org.sa). The specifications formulated by the Commission are legally binding. Thus, every study program must undergo the NCAAA accreditation and comply with the Bachelor predetermined criteria set by the NCAAA Commission. The Accreditation process conducted by the AHPGS runs independently from the NCAAA.

The Accreditation Commission of the AHPGS resolves the decision towards accreditation of a study program on the basis of the Application documents, the On-Site Visit at the College of Applied Medical Sciences in Riyadh, and the Expert Report.

The accreditation process is carried out in four steps:

I. The university application

The AHPGS verifies the sufficiency of the documents submitted by the university, namely the Application and its corresponding Annexes. These are to fulfill the Accreditation Criteria. The agency ensures that the international legal requirements in matters of higher education are met. As a result, the AHPGS comprises a summary (see 2.-5.), which is to be approved by the university and subsequently made available for the expert group, together with all other documentation.

II. The written review of the study programs

The main documents – namely the Application and the Course Descriptions – are reviewed by the expert group in order to verify their compliance with the applicable Accreditation Criteria. Consequently, the experts comprise a short summary regarding the study programs.

III. On-Site Visit (Peer-Review)

The experts assigned by the AHPGS carry out the external, On-Site Visit at the higher education institution. During the On-Site Visit, discussions with various members of the institution take place, from university and department administration, to degree program management, lecturers and students. This offers the expert group details about the degree program beyond the written documents. The task of the experts during the On-Site Visit is the verification and evaluation of the objectives of the program and its projected study results, its structure, staff, material resources, course of studies and methods of assessment (selection of students, assessment of achievements, students' support), as well as of the program management (program administration, external assurance of study quality).

After the On-Site Visit, the expert group issues the Expert Report based on the results of the visit, the written review of the study programs, and the documents submitted by the university. This Expert Report is made available to the university, in order for it to issue a Response Opinion.

IV. The AHPGS decision regarding accreditation

For the accreditation decision, the AHPGS Accreditation Commission evaluates the university Application as well as its annexes, the Summary comprised by the AHPGS agency, the Expert Report, as well as the university Response Opinion. These documents form the grounds for the accreditation decision of the AHPGS Accreditation Commission.

2. General

The application for accreditation (without the awarding of the official seal of the accreditation trust for study programs in Germany) of the Bachelor study program "Biomedical Technology - Instruments" (here Application) of the King Saud University, Riyadh, College of Applied Medical Sciences (CAMS) was

submitted to the Accreditation Agency for Study Programs in Health and Social Sciences (AHPGS e.V.) on the 12.05.2011. The contract between the College of Applied Medical Sciences of the King Saud University and the AHPGS was signed on the 03.06.2011. This stipulates the review for accreditation of the following Bachelor study programs: "Biomedical Technology - Instruments", "Clinical Laboratory Sciences", "Clinical Nutrition", "Dental Hygiene", "Health Education", "Optometry", "Physical Therapy", "Radiological Sciences".

On the 27.07.2011 the AHPGS has forwarded to the College of Applied Medical Sciences the Open Questions pertaining to the Application for accreditation submitted by the College. On the 17.08.2011 the College submitted to the AHPGS the Response to the Open Questions in electronic format.

The summary of the Bachelor program "Biomedical Technology - Instruments", prepared by the AHPGS, was approved by the Deanship of quality and development, College of Applied Medical Sciences, KSU on the 10.09.2011.

The application for accreditation submitted by CAMS for the study programs follows the outline recommended by the AHPGS. Alongside the application request for verification towards accreditation of the study program "Biomedical Technology - Instruments", the following additional documents are to be found in the application package (the documents submitted by the applicant are numbered in the following order for easier referencing):

The documents listed below are generally valid for all study programs submitted by CAMS for accreditation:

Annex	Description
Annex 1	Internship evaluation form
Annex 2	Credit and contact hours for all programs
Annex 3	Course Descriptions for the common courses
Annex 4	Declaration confirming the spatial, material and financial resources
Annex 5	KSU Quality management handbook
Annex 6	KSU Student guidebook

Specific documents for the Bachelor study program “Biomedical Technology - Instruments”:

Annex	Description
Annex 7	Program structure
Annex 8	Course descriptions
Annex 9	Short resumes of selected teaching members
Annex 10	Teaching matrix
Annex 11	Department manual
Annex 12	Weekly timetable
Annex 13	Department equipment and laboratories
Annex 14	Teaching engineers personnel

The accreditation procedure is carried out on the basis of the accreditation standards of the AHPGS for international reviews.

The On-Site Visit took place on 30.09-02.10.2011. The present assessment report is based on the University’s application, the additional documents, the written expert reviews and the results of the On-Site Visit.

Following the recommendation of the experts and of the Accreditation Commission, the AHPGS has reached a positive decision regarding the application towards accreditation of the Bachelor study program “Biomedical Technology - Instruments” of the King Saud University, Riyadh, College of Applied Medical Sciences. Thus, the agency accredits the present study program without further conditions. This is valid five years, until the 15.12.2016.

3. Content issues

3.1 Structure of the program and professional requirements

The final goal of the Bachelor program “Biomedical Technology - Instruments” is to prepare specialists in biomedical technology that can supply for the need for such professionals in institutions and companies. By providing students with up-

to-date knowledge, as well as by developing their competencies in the respective field, the program aims at instructing healthcare professionals that can operate with sophisticated, advanced medical technology (cf. Application, A1.3, p. 3).

The courses of the program are taught in English and finalize with awarding the final degree of “Bachelor of Science” in Biomedical Technology - Instruments. The study time of the program is divided among credit hours. One lecture credit hour equals one contact hour spent during classes. One practical credit hour equals two contact hours spent during practical work (in the laboratory, for example) (cf. Application, A1.6). The program amounts to a total of 2130 credit hours – including the common Phases I and II, (see Section 3.1. Curriculum of the present Summary) and cf. Annex 2 of the Common Annexes. The program is offered only in the full-time form and has a total duration of 9 semesters, and additionally 2 semesters for the internship planned after having completed the theoretical courses. This results in a total duration of 11 semesters (5.5 years). The study time equals a total number of 3015 contact hours for all levels (ibid.), not including the internship, the extra class hours, the individual study hours, and the final exams. A more detailed view on the division of the contact hours among levels and phases is available in Annex 2 of the Common Annexes. For the internship there is a total of 2000 contact hours assigned (no credit hours assigned to it). These equal a number of 40 work hours/week, the equivalent of 8 hours/day. The program is divided in 4 phases, as summarized in the following table (cf. the information offered in Annex 2 and the Responses to the Open Questions):

Study Phases of the course	Levels	Total Number of Credit Hours	Total Number of Contact Hours
Study Phase I: Preparatory year	1 and 2	495	915
Study Phase II: CAMS core program	3	255	270
Study Phase III: Department modules	4-9	1380	1830
Study Phase IV: Internship year (full-time)	--	--	2000
	Total	2130	5015

Thus, the total workload for the Bachelor study program “Biomedical Technology - Instruments” amounts to a total of 5015 hours, including the internship.

The course of study is designed so as to provide students with both sound theoretical knowledge and practical experience. In this sense, they are instructed in basic engineering principles, as well as in extensive biomedical electronics applications. Moreover, they are familiarized with the maintenance and operation of complex biomedical equipment. Thus, apart from the notions and concepts they are introduced to during their studies, students require previous knowledge in physics, mathematics, and medical anatomy (cf. Application, A1.3, p. 3). In addition to this, during their first year of study, students are familiarized with general-knowledge notions, such as computer operation basics, communication skills, or English language (see Table A1.3.2., p. 5, Phase I). In order to graduate, students must comprise a final project. This has assigned 3 credit hours/week assigned, adding up to 45 credit hours for the entire course respectively.

The “Biomedical Technology - Instruments” Bachelor program was the pioneer program in the Kingdom of Saudi Arabia in the respective field (cf. Application, A2.1). The earliest beginning of the Bachelor study program took place in the year 1982. The number of students expected to graduate in 2011 is of 40 students.

Students are admitted to the program in both semesters of the academic year – Fall and Spring. The maximum number of seats available per semester is 40. For the Fall semesters, 2010-2011, 25 students were admitted. For the Spring one, the same year, 39 students.

With regards to the tuition fees, the KSU regulations apply for the “Biomedical Technology - Instruments” students, namely that there are no tuition fees for the Bachelor program.

According to the Application, the KSU significantly sets a significant focus on the learning resources available for its students. Aside from physical resources available in the KSU libraries, online ones such as the e-learning and Distance Education systems have been developed. The *Elluminate Live* program enables student communication with virtual classrooms and permits interactive teaching with the help of videos or other technological devices. Recently, the university has introduced the E-register and the Edugate system, which allows university members access to student evaluation results and permits an accurate track of the student's academic progress.

The international aspects of the curriculum are described in the Application under Section A1.14. On the one hand, the curriculum of the "Biomedical Technology - Instruments" program is aligned with programs available worldwide: 63% of the courses are common with the similar undergraduate program offered at the University of Liverpool (Liverpool, United Kingdom), and 45% of the courses are similar with the equivalent undergraduate program at the University of Pittsburgh, (Pittsburgh, United States) (Application, A.1.14).

The Biomedical Technology Department holds research partnerships with international institutions from which the teaching and research personnel benefits. The latest development in this matter is an international collaboration with the Biomedical Engineering Department of the University of Pittsburgh, USA, which currently finds itself in the final phase (cf. Application, A.1.15).

3.2 Curriculum

The program is structured according to 4 phases. In order to successfully graduate, students must complete all these phases. These four phases are further divided into corresponding levels. Each level corresponds to one semester. For each level, there are specific courses assigned. These courses add up to a total of 50 (cf. Application, A1.11). An overview of the program, its

division upon phases and levels, as well as its courses can be found in the subsequent table (comprised after the information offered in Application, A1.3, Table A1.3.2 *Overall Summary of Course Requirements*):

Phase I			
	Course Code	Course Title	Credit hours
Level 1 (15 Credit Hours)	MC 140	Communication Skills	2
	MATH 140	Introduction to Mathematics	2
	CT 140	IT Skills	3
	ENGL 140	English Language Skills I	8
Level 2 (18 Credit Hours)	STAT 145	Biostatistics	2
	CHM 145	Introduction to Organic Chemistry	2
	PHYS 145	General Physics	3
	ZOOL 145	General Zoology	3
	ENGL 145	English for Medical Purposes	8
Phase II			
	Course Code	Course Title	Credit hours
Level 3 (17 Credit Hours)	ICL 102	Islam and Community Building	2
	ARAB 103	Expository Writing	2
	CHS 221	Advanced Biostatistics	3
	CHS 241	Professions and Care Delivery Systems	3
	CLS 221	Basic Anatomy and Physiology	4
	NUR 241	Principles of Emergency Care	3
Phase III			
	Course Code	Course Title	Credit Hours
Level 4 (17 Credit Hours)	BMT 211	Biomedical Electronics (I)	4
	BMT 227	Principles of Computing	2
	BMT 222	Applied Mathematics for BMT (I)	2
	BMT 221	Mechanical Skills	3
	BMT 224	Applied Physics for BMT	4
	IC 103	Islamic Economy	2
Level 5 (17 Credit Hours)	BMT 212	Biomedical Electronics (II)	4
	BMT 225	Measurement Techniques	2
	BMT 226	Basic Electrical Skills (I)	2
	BMT 223	Applied Mathematics for BMT (II)	2
	BMT 228	Biomechanics	2
	BMT 232	Principles of Mechanical Biomedical Instrumentation (I)	3
	IC 104	Fundamentals of Islamic Politics	2

Level 6 (15 Credit Hours)	BMT 313	Biomedical Electronics (III)	3
	BMT 333	Electrical Machines in Biomedical Equipment	2
	BMT 323	Advanced Electrical Skills (II)	2
	BMT 336	Optical Biomedical Instrumentation	3
	BMT 337	Biomaterials	2
	BMT 335	Mechanical Biomedical Instrumentation (II)	3
Level 7 (14 Credit Hours)	BMT 314	Biomedical Electronics (IV)	3
	BMT 315	Introduction to Biopotentials	2
	BMT 367	Hospital Safety	2
	BMT 334	Biomedical Imaging Equipment	3
	BMT 338	Bioengineering Design	2
	RHS 372	Audiology	2
Level 8 (15 Credit Hours)	BMT 413	Biomedical Electronics (V)	3
	BMT 415	Digital Signal Processing	3
	BMT 432	Special Topics in Biomedical Equipment	4
	BMT 437	Biological Control Systems	2
	BMT 484	Automation in Clinical Labs.	3
Level 9 (14 Credit Hours)	BMT 414	Biomedical Electronics (VI)	3
	BMT 485	Biomedical Computing	4
	BMT 468	Clinical Practice / Project	3
	BMT 465	Maintenance Management	2
	RHS 422	Rehabilitation Procedures	2
Phase IV			
Internship - 1 year (2 semesters)			

The Course Descriptions of the Bachelor study program “Biomedical Technology - Instruments” (Annex 8) of the College of Applied Medical Sciences of the King Saud University contains specifications regarding the Aims and goals/skills to be developed in each course, its Contents and Evaluation, as well as the Language of teaching and the exact assignment of Credit Hours (lecture and practical). However, this is comprised particularly with reference to the Biomedical Technology-specific courses which form the levels 4 to 9 (Phase III). For the General Modules and CAMS Modules (levels 1-3, Phases I-II) detailed information is provided in the Common Annexes. Their respective course descriptions follow the similar structure as for program-specific courses.

Phase I includes the Preparatory Year – levels 1 and 2 – and refers directly to the university requirements of the King Saud University. This phase contains general courses which all KSU students have to complete. According to the Application, it includes general education courses, mathematics, basic sciences and English courses (cf. Application, A2.2, p. 15). English is one of the main focuses within Phase I, as it has assigned 16 credit hours, half of the total amount of credit hours for the first year. Basic sciences include physics, biology and chemistry (ibid.).

Phase II – the third level – includes College and Departmental requirements and contains the core program common for CAMS, i.e. lectures common for all CAMS students. This comprises 3 general education courses and 3 basic sciences courses (cf. Application, A2.2 p. 15).

Phase III includes the “Biomedical Technology” courses. This contains specific courses for the Bachelor program and expands over level 4 to 9. Out of a total of 35 courses comprised in this phase, 4 of these are taught externally from the department. According to the Application, the total number of credit hours for this phase amounts to 92. 14 credit hours are assigned to mathematics, basic sciences, and general education courses, which have to be completed in levels 4 and 5. Levels 4 and 5 also include the completion of 7 core courses specific for the “Biomedical Technology - Instruments “program, for which 20 credit hours assigned, and 2 courses are shared with other departments (4 credit hours). The rest of 58 credit hours are assigned to Biomedical Technology (BMT) specialty courses, which have to be completed in levels 6 to 9 (cf. Application, A2.2. p. 15).

As a general requirement, students may not enroll in a new course without having completed the previous ones and the prerequisite one(s) for that specific course. A delineation of the inter-connection and dependency between courses can be seen in Figure A.2.2.1: *Prerequisites and co-requisites organisation diagram for BMT study program* in Section A.2.2. of the Application, p. 15.

In order to supply for the necessary practical experience, laboratory hours are also integrated within the courses themselves. These familiarize students with field-related aspects of biomedicine beyond the theoretical spectrum of the classroom. In this sense, the Department of Biomedical Technology has available modern, fully-equipped laboratory rooms in which students learn to use the relevant instrumentation (cf. Application, A1.3, p. 4).

The last level, level 9 also covers the graduation research project (course BMT 468), which is mandatory for all students wishing to successfully graduate from the Bachelor program. In this sense, the faculty members present the project topics to the course coordinator. This, in turn, announces the topics to the students. The students choose three major topics from the available selection according to their preference. Subsequently, the projects are distributed to the students on the basis of their GPA. If a student's first choice has already been assigned to a student with a higher GPA, then the next topic in the order of preference will be assigned to the first student. In the end, each project is covered by a team of at least two students. The students are supervised by the teaching staff. They discuss each stage in the project, and are evaluated by that member of the staff that has supervised them. At the end of the course, students present their project to an evaluation commission and subsequently to the College by means of a poster presentation. After completing the course, they should have developed skills in undergoing research, scientific writing, data analysis and project design (cf. Responses to the Open Questions).

For the final grade of the project, the following percentages are taken into account:

- Lecture: 30%: students have to pursue one theoretical lecture on their research topic; at the end of the course, they will have to take a written evaluation.
- Practical and Supervision: 30%: students have to consult with their project supervisor weekly, comprise a final report at the end of the project.

- Report Evaluation: 20%: the final report is examined by three external evaluators, and an average mark is agreed upon;
- Oral and Poster Presentation: 20%. Students present the project to the external evaluators and the project coordinator; in order to assess their knowledge, a Question and Answer section is also integrated (cf. Application, A1.20, p. 13-14).

The last phase, **Phase IV**, contains the internship and its successful completion. It is a mandatory requirement for all students who wish to successfully graduate. However, this can start only after the student has completed all theoretical courses planned in the Bachelor program. The internship extends over a period of one year in which the students work full time (50 weeks, 5 days/week, 8 hours/day) in the engineering department of a healthcare institution or company upon which the CAMS College has agreed upon (e.g. Siemens or Philips). The students are assigned to hospitals according to their GPA grade and their personal preference. Within the Bachelor program, there is a faculty supervisor, as well as an internship coordinator which monitor the students' progress. At the end of the year, both students and hospital management have to complete a form pertaining to the students' experience during the internship. For the internship there are no credit hours assigned. However, the workload amounts to a total of 2000 hours to be added to the total workload of the Bachelor study program „Biomedical Technology - Instruments“.

According to the Application, A.1.20, students participate actively in the medical-instrumental environment. They provide partial maintenance work for the technical equipment, and attend training sessions and workshops relevant for their field of activity. Moreover, the link between theoretical knowledge and practical application is enforced by making students aware of the domestic market needs of medical devices and build upon the ability of comprising detailed written documents pertaining to medical specifications.

With regards to the examination system, Application A1.13 provides more details. According to it, this is a “competence-oriented” system (cf. Application A1.13, p. 10), which measures the achievement of the course objectives both directly and indirectly. The “direct assessment methods” (ibid.) involve firsthand assignments, evaluations, presentations or reports. According to the type of course, there are various assessment methods employed. For example, in theoretical courses, students are evaluated with the help of mid-term and final exams, both of them complexly constructed (as described in Application, A1.13). Students are assessed according to the GPA scale¹, and must pass all courses with a minimum grade of 3.0 out of 5.0. Moreover, students must maintain a cumulative GPA (average grade) of 2.0 throughout the course of study. This is calculated by taking into account all the methods by which the student has been evaluated during the course. The precise evaluation scale, as well as further details, can be found in the Application, Section A1.13, p. 10-11. Internships are evaluated with the help of reports and continuous examination.

According to the Application, the Bachelor program in “Biomedical Technology - Instruments” has a particular character at the KSU: it is the only one that permits its graduates to work as specialized engineers in hospitals, institutions and the biomedical industry. A similar program at the KSU prepares technicians in the field (cf. Application A1.19, p. 13). Similar programs are offered at other

¹ A student's Grade Point Average (GPA) is determined by dividing the cumulative point value of all the attended courses over the number of units in the student's semester schedule. In all categories of courses, the students are assessed by a grade according to the following scale:

Grade	Numerical	Average Point
A +	95-100	5.0
A	90-94	4.75
B +	85-89	4.5
B	80-84	4.0
C +	75-79	3.5
C	70-74	3.0
D +	65-69	2.5
D	60-64	2.0
F	≤59	1.0

The cumulative GPA can be translated as following:

4.50 ≤	Excellent
3.75 – 4.50	Very Good
2.75 – 3.75	Good
2.00 – 2.75	Pass
≤2.00	Fail

institutions – however, due to their recent establishment, they have had no graduates up to this point. The university application also notes that most similar programs available worldwide take place in engineering education institutions, rather than in medical sciences ones (ibid.).

3.3 Educational objectives

At the end of the Bachelor program “Biomedical Technology - Instruments”, a graduate should be skilled in the following practices: “Modifying and designing biomedical equipment according to the needs of the workplace. Instruction for proper and safe use of equipment in the best and most efficient way. Maintaining, calibrating and operating different biomedical equipment.” (Application, A.1.3., p. 3)

Thus, the course of study aims at instructing highly-qualified labor force in the field. The students are prepared in a competent manner in order for later to pursue careers in biomedical technology as advisors, managers or techno-entrepreneurs (cf. Application, A1.11, p. 7). According to the Application, Section A2.1 the mission of the program is to “[prepare] highly competent graduates in the field of Biomedical Equipment Technology to support the health care sector, and to serve the community” (Application, A2.1, p. 14).

Through the course of study, students become able to apply theoretical knowledge on modern tools, as well as practical techniques and skills. Moreover, they gain extensive knowledge in mathematics, science and engineering. This enables them to conduct, analyze and interpret experiments, to design complex systems and to develop problem-solving capacities (cf. Application A2.3.).

3.4 Labour market situation and employment opportunities

The „Biomedical Technology - Instruments“ program was initiated in order to supply the need for proficient technological personnel in hospitals and research centers. The expansion of healthcare institutions over the past years presents numerous employment opportunities for the graduates of the Bachelor program. According to the Application, Section A2.1, these can find a workplace within 3 months from graduation. According to Section A3.2 of the Application, 79% of the students who graduated within the last 6 months are already employed and 19% are enrolled in postgraduate courses of studies. This leaves only a 2% which neither seek employment nor further education.

Students can be employed in hospitals and clinics, as well as in the medical equipment industry as “medical equipment specialist” (Application, A3.1). Thus, they may choose whether to work in the public or private sector.

Moreover, by completing the Bachelor program, they gain the opportunity to pursue further graduate studies at international level, such as Master or doctoral (PhD) programs (cf. Application A2.1, p. 14).

Application, Section A3.1. offers more detailed information about the prospective employment of graduates and the work they may undertake in the following fields: hospitals, the industry, academic institutions, medical equipment companies, research centers, and government bodies for Standardization and Metrology.

3.5 Access and admission requirements

For the Bachelor program there are two types of common criteria applying for prospective students: the General Admission Requirements and the College of Applied Medical Sciences Admission Requirements. In addition to this, there are specific requirements for each program.

The General Admission Requirements demand that a prospective student fulfils the following conditions:

- has obtained a secondary school certificate recognizable in Saudi Arabia within the past five years up to the time of enrollment;
- holds an advanced knowledge of English;
- successfully passes the interview conducted by the Senate, and fulfils any additional requirements;
- has not been eliminated from any other university on disciplinary or educational grounds;
- makes proof of proper conduct and is medically fit;
- if the case, he has obtained the written approval of the employer for enrolling in the Bachelor course.

If all the above conditions are fulfilled, the Senate makes its decision on the basis of the school marks and the personal interview conducted with the prospective students.

Specific requirements for the Bachelor in “Biomedical Technology - Instruments” demand that the applicant has graduated from secondary education with a cumulative GPA of minimum 3.5 (from 5.0.) and that the mathematics and science courses were part of his study (cf. Application A2.6., p. 17).

3.6 Quality assurance

Quality assurance is among the main goals of the King Saud University when developing its programs. In this sense, a Quality Management System has been established and institutionalized. The Quality Management System (QMS) at the KSU is based on two main components: Internal Quality Assurance (IQA) and External Quality Assurance (EQA). In this sense, the criteria which apply for EQA represent the standpoint for IQA. In shaping the IQA standards and criteria, the university has based itself on the National Commission for Academic

Accreditation and Assessment (NCAAA) requirements for quality assurance. This has resulted in the outline of 11 Standards and 58 Criteria valid for the assessment methodology.

The Quality Assurance criteria considered when designing Bachelor programs are detailed in the KSU Quality Management Handbook (Annex 5). The Handbook proposes the methodology by which the IQA can comply with NCAAA and international standards. The document is constructed by following the indications presented in the following documents of the NCAAA: *Standards for Quality Assurance and Accreditation of Higher Education Institutions* (Version: November 2009 for institutions) and *Standards for Quality Assurance and Accreditation of Higher Education Programs* (Version: November 2009 for programs).

The KSU Quality Management System (QMS) is overarching, referring thus to all the institutions at the University. Likewise, the Handbook offers general guidelines in designing and planning Bachelor programs. Furthermore, the Handbook also regards Quality Management at a broader level, namely at department, faculty or college level.

Within the CAMS Quality Management System there are four main committees involved in ensuring the compliance with the afore-mentioned standards and criteria: the quality and accreditation committee, the research and community service committee, the curriculums committee and academic strategic planning committee. These are supported at smaller levels by other assemblies. In implementing quality assurance, faculty members and teaching personnel play a key role by comprising course and program reports, program specifications and pursuing constant quality evaluations. The academic staff prepares the course specifications, in which the learning outcomes are stated. At the end of the course, a report is comprised verifying whether the goals have been met. Its

results are summarized in the annual self-report, which is available for all faculty staff in both written and electronic form.

Application, Section A5.3 offers details about student assistance within the program. The undergraduate student handbook contains specification pertaining to the "Biomedical Technology - Instruments" study program itself, as well as to overarching aspects of CAMS and KSU. A Student Counseling and Guidance unit is open to all students, as is the KSU's Psychology and Social Counseling Unit. These aid students in both personal and academic matters. CAMS orientation programs are conducted for students in order to aid them with the curriculum and career choice. The teaching members are available through their office hours (minimum 6 hours/week).

Application, Section A5.5 offers details regarding students' own assessment of the program and its sufficiency beyond the academic spectrum. According to the Application, at the end of each semester course, students complete an evaluation form and evaluate the course. Moreover, a survey was conducted at the end of the second semester of the academic year 2009-2010. This meant to verify the outcomes of the study program among current graduates. Out of a total of 30 interviewees, 43% expressed an overall satisfaction with the faculty. Out of this percent, 70% were especially satisfied by the theoretical learning process, while only 45% by the practical learning one. About half of the total number of students interviewed were pleased with the curriculum and the courses it contains. The overall results of the study show that the „Biomedical Technology - Instruments“ program needs improvement especially in the community and work-field related areas

Pertaining to the training of the teaching personnel, the KSU encourages the continual instruction of its lecturers and professors. These are advised in matters of teaching planning, curriculum and timetable. All teaching personnel is required to attend orientation programs and professional development programs. The KSU

has developed a Deanship of Skills Development, which provides support in terms of workshops, courses, seminars, or conferences. Moreover, the office of Deanship of E-learning and Distance Education provides training in electronic form. A notable development within the CAMS program is the Unit for Development, an initiative awarding excellence in teaching (cf. Application, A5.8, p. 26).

Section A5.10 of the Application offers information about the special support for students with disabilities. The University supports disabled students and meets the spatial demands for the participation of such students. Disabled students benefit from an allowance from the Deanship of Student Affairs at KSU. Students with disabilities are divided into two major groups: students with severe disabilities, and students with moderate disabilities.

4. Personnel and spatial equipment

4.1 Teaching Personnel

Annex 10 of the annexes for the Bachelor program provides an overview of the teaching personnel. The teaching staff amounts to a total of 15, out of whom 12 employed on a full-time basis, and 3 on a part-time one. Out of these, 2 are Professors, and 3 hold a doctoral degree. According to Application, B1.2, the teacher-student ratio for first-semester students is 1:12.2 (p. 27).

Potential teaching staff should hold at least a Master of Science (MSc) degree, if not a doctoral one (PhD). The recruitment committee established by the council of the Biomedical Technology Department revises the applications submitted and appoints the personnel based on the teaching and department needs (cf. Application, A5.7., p. 23).

4.2 Equipment for Teaching and Research

According to the Application, the spatial facilities are both advanced and up to date. This refers to both lecture rooms and laboratories. Moreover, the department is equipped with a conference room. There are 10 fully-equipped laboratories and 4 classrooms equipped with smartboards and Electronic-podiums (cf. Application, B3.1).

The KSU library has access to the latest publications and international journals in numerous fields, including biomedicine and engineering. It has access to both physical and electronic resources, such as digital libraries or E-learning services. Table B3.2.1. *KSU Libraries Holdings* (Application, Section B.3.2, p. 28) lists the documentation available on all campuses. The subsequent table (Table B3.2.2 *CAMS Library Holdings*) lists the documentation CAMS has available for its students. Moreover, all the libraries have available computer workspaces equipped with Internet connection. The students also have access at the intranet network of the university, including the Edugate system.

5. Institutional Environment and Structural Conditions

King Saud University has been established in November 1957 – a fact which deems it the first university in both the Kingdom of Saudi Arabia and the Gulf Region. Currently, it is among the top 400 world universities, as listed by the 2010 Shanghai Jiao Tong Academic Ranking of World Universities. Currently, the university has 53 colleges and 250 undergraduate, graduate, and postgraduate programs. In these are enrolled a total of 61.115 students, 35.893 male and 25.222 female. A table with the major developments that took place within the KSU can be found under Section C1.1 of the Application, p. 29-30. The KSU is continuously developing by establishing new Deanships and, research programs, or science parks (See Application, C.1.1, p. 28-29).

The university also sets great emphasis on the research possibilities and attempts at making these available for all its members. In this sense, numerous Research Chairs, Centers for Excellence, and Research Institutes have been established. A noticeable result is the increase in high-quality publications and the participation in team research work. The PhD and Master's programs available at the KSU also strongly encourage research. For supporting this type of activity, the university has started developing a corresponding infrastructure, ensuring the physical, technological and spatial needs for laboratories, libraries and classrooms. Section C1.2. of the Application offers extensive information on the current research developments present at both KSU and CAMS.

Alongside the KSU, the College is also continuously developing, setting new goals in matters of accreditation, quality standards, curriculum design and electronic learning.

The College of Applied Medical Sciences has been established in 1977, under the name of College of Nursing. It thus become the first college of its kind in Saudi Arabia. In 1978 the present CAMS separated from the College of Nursing under the name of College of Allied Health Sciences. In 1986 it became the College of Applied Medical Sciences. The College has seven departments. Overall, CAMS offers 16 programs at both graduate (4 Master programs) and undergraduate levels (12 Bachelor programs).

The following table lists the CAMS Departments, the study programs each offers, as well as whether these are available for female and/or male students:

Department	Study Program		Availability
Biomedical Technology	Bachelor	Biomedical Technology - Instruments	Male students
Community Health Sciences	Bachelor	Clinical Nutrition	Male and Female students
		Health Education	Female students
	Master	Clinical Nutrition	Male and Female students

Clinical Laboratory Sciences	Bachelor	Clinical Laboratory Sciences	Male and Female students
	Master	Clinical Laboratory Sciences	Male and Female students
Dental Health	Bachelor	Dental Health	Male and Female students
		Dental Technology	Male students
Optometry	Bachelor	Optometry	Male and Female students
	Master	Optometry	Male and Female students
Radiological Sciences	Bachelor	Radiological Sciences	Male and Female students
Rehabilitation Sciences	Bachelor	Physical Therapy	Male and Female students
		Speech and Hearing Disorder	Male and Female students
		Respiratory Therapy	Male students
		Occupational Therapy	Male and Female students
	Master	Physical Therapy	Male and Female students

The Biomedical Technology Department was established in 1982 in order to meet the need for professional technicians in the field. For the year 2011, there are 142 students enrolled in the department, all of them following the Bachelor course of study. Current developments mentioned in the Application are: the improvement of the curriculum for the Bachelor program; the beginning of the accreditation process at national and international level for the program; the planning of an additional Bachelor program in "Biomedical Informatics", as well as a Master's degree in "Biomedical Technology - Instruments".

6. Expert Report

I. Preliminary remarks

The accreditation of the Bachelor study programs "Biomedical Technology - Instruments", "Clinical Laboratory Sciences", "Clinical Nutrition", "Dental Hygiene", "Health Education", "Optometry", "Physical Therapy" and "Radiological Sciences" of the King Saud University, Riyadh, College of Applied Medical Sciences was carried out following a structured procedure:

1. During the first step, the King Saud University submitted the Application documents to the AHPGS. The AHPGS subsequently prepared the documents in

order for the expert group to examine them and verify their compliance to international accreditation standards.

2. During the second step, the members of the expert group formulated their appraisals and observations in the form of written reports. The written reports submitted by the expert group consisted the basis for the Open Questions forwarded to the College.

After the College had submitted the Responses to the Open Questions, the AHPGS processed these and the Application documents, as well as a Summary of the Application for each study program. These documents were forwarded to the members of the On-Site expert group as basis for the upcoming On-Site Visit.

3. During the third step the On-Site Visit of the King Saud University, Riyadh, College of Applied Medical Science was carried out.

4. The fourth step involves the final accreditation decision of the AHPGS Accreditation Commission. In making its decision, the Commission evaluates the University's Application and its annexes, the Summary comprised by the AHPGS, the Expert Report, as well as the University Response Opinion.

The following experts were appointed by the AHPGS Accreditation Commission for the accreditation of the eight study programs at the College of Applied Medical Sciences of the King Saud University, Riyadh²:

- *Prof. Dr. Torsten Albers; German University of Applied Sciences for Prevention and Health Management, Saarbrücken, Germany*
- *Prof. Dr. Thomas Bals; University of Osnabrück, Germany, Faculty of Cultural and Educational Sciences*
- *Prof. Dr. Bernhard Borgetto; University of Applied Sciences and Arts, Hildesheim, Germany, Faculty of Social Work and Health*

² The On-Site Visit was carried out by the hereinafter mentioned Experts, written in italics; chairperson of panel: Dr. Rolf Heusser.

- Prof. Dr. Marie-Luise Dierks; Hanover Medical School, Germany
- Prof. Dr. Holger Dietze; Beuth University of Applied Science, Berlin, Germany, Department of Optometry
- *Prof. Dr. Dr. Bernd Domres; Eberhard Karls University Tübingen, Germany, German Institute for Disaster Medicine and Emergency Medicine and Foundation of the German Institute for Disaster Medicine*
- Prof. Dr. Peter Franzkowiak; University of Applied Sciences Koblenz, Germany, Department of Social Work, Health Sciences and Social Medicine
- Tina Hartmann; German Association for Technical Assistants in Medicine (dvta), technical instructor for medical-technical radiology assistants at the UKSH Academy of the University Medical Center Schleswig-Holstein, Germany, Department of Medical-Technical Radiology Assistancy
- *Dr. Rolf Heusser; Chairman European Consortium for Accreditation (ECA), NICER (Swiss National Institute for Cancer Epidemiology)*
- Prof. Dr. Dr. Friedrich Hofmann; University of Wuppertal, Germany, Department of Work Physiology, Occupational Medicine and Infectiology; Ministry of Health, Germany, member of the Permanent Commission on Vaccination
- Prof. Dr. Sylvia Kaap; University of Applied Sciences Wiener Neustadt, Austria, Faculty of Healthcare, study program "Biomedical Analytics"
- *Amalia Kalinca; Master student at the Albert-Ludwigs-University, Freiburg, Germany*
- Prof. Dr. Kathrin Kohlenberg-Müller; University of Applied Sciences Fulda, Germany, Professorship for Nutrition
- Christoph Koltermann; student at the Beuth University of Applied Science, Berlin, Germany
- Prof. Dr. Stephan Lehnart; University of Göttingen, Germany. Heart Research Center Göttingen, Dept. of Cardiology & Pulmonology, University Medical Center Göttingen, Germany, and University of Maryland Biotechnology Institute, USA

- Dr. mult. Ulrich Longerich; Managing Director of Prognath, a device for orthodontics, maxillofacial surgery and plastic surgery
- Beate Methke; Institute for Medical Microbiology and Hygiene, University Clinic, Freiburg, Germany, Department Immunology, Research and Diagnostic
- Dr. Werner Reiche; Clinical Centre of the city of Ludwigshafen gGmbH, Senior Doctor and Head of Neuroradiology and Vascular Intervention
- Sabrina Rose; student at the Beuth University of Applied Science, Berlin, Germany
- Martin Thiel; German Professional Group for Orthopedic Manual Therapy (Deutsche Fachgruppe für Orthopädisch Manuelle Therapie - DFOMT e.V)
- *Prof. Dr. Jürgen v. Troschke; Albert-Ludwigs-University Freiburg, Germany, Professorship for medical sociology, former member of the Executive Committee of the Association of the Scientific Medical Societies in Germany (AWMF)*
- Prof. Dr. Ursula Walkenhorst; University of Health Sciences, Bochum, Germany, College of Health

The standards and criteria (hereon Accreditation Criteria) applicable in the case of international accreditation were developed by the AHPGS in close accordance with the existing criteria and requirements valid in the Federal Republic of Germany and based on the "Standards and Guidelines for Quality Assurance in the European Higher Education Area", established by the European Association for Quality Assurance in Higher Education (ENQA). In this sense, the responsibility of the experts during the accreditation process consists in evaluating the study program concept and the plausibility of its intended realisation at the higher education institution. These aspects pertain to the following areas in particular: "program aims and learning outcomes", "curriculum design", "staff", "facilities and learning resources", "study process and student assessment", and "program management".

II. The study program to be accredited

The study program “Biomedical Technology - Instruments” is designed as a full-time program with an intended duration of eleven semesters. The total study time amounts to 5015 hours. This is divided into 3015 contact hours for the theoretical part of the study program, and 2000 hours assigned for the internship. Accordingly, the theoretical part comprises a total of 50 courses distributed over the 9 levels. The study program finalises with awarding the degree of “Bachelor of Science”. The admission requirements demand from prospective students that they have obtained a secondary-school leaving certificate and that they hold an advanced knowledge of the English language. In addition to this, they must successfully pass the admission interview conducted by the University Senate and must fulfill the program-specific admission requirements. Students were first admitted to the program in 1982. The program is available for male students. The main goal of the study program is to prepare qualified specialists that can operate, calibrate and maintain sophisticated medical equipment. After graduation, students can be employed as specialised engineers in hospitals, healthcare institutions, as well as in private companies in the biomedical industry. The program was a pioneer program in the region, in the sense that it was the first initiated in the field of biomedical technology.

III. Accreditation Criteria

The Accreditation Criteria considered are developed by the AHPGS in close accordance with the existing criteria and requirements valid in the Federal Republic of Germany and based on the “Standards and Guidelines for Quality Assurance in the European Higher Education Area”, established by the European Association for Quality Assurance in Higher Education (ENQA).

These Criteria cover the following six main domains:

- (1) Program aims and learning outcomes
- (2) Curriculum design
- (3) Personnel
- (4) Facilities and learning resources
- (5) Study process and student assessment
- (6) Program management

The Criteria were made available to the expert group at the beginning of the accreditation process. Accordingly, the written evaluations submitted by the experts are grounded on these criteria.

IV. Report of the expert group

On 30.05.2011 the Application documents submitted by the university were made available to the expert group for written evaluation and verification of compliance with the Accreditation Criteria (as mentioned in III. Accreditation Criteria, see above). The last submission date for the written evaluation by the experts to the AHPGS was the 15.09.2011. Their results subsequently served as part of the basis for the On-Site Visit.

Prior to the On-Site Visit, a preliminary meeting among the expert group took place. During this meeting, issues pertaining to the submitted Application documents, the results of the written evaluation, as well as any resulting questions or queries were discussed. In addition to this, the schedule for the On-Site Visit at the higher education institution was arranged.

The On-Site Visit took place from 30.09.2011 to 02.10.2011 according to the specified schedule. The expert group was accompanied by AHPGS representatives.

The experts conducted talks with University management, the quality assurance management at the College, representatives of the College and of the departments, program directors and teaching staff, as well as with students. In addition to this, the expert group evaluated during the On-Site Visit the facilities and spatial resources available in the female and male campuses, including the King Saud University Library.

The present Expert Report is constructed following the above mentioned Accreditation Criteria. These criteria will be discussed in a comprehensive manner in what follows. References to individual study programs will be indicated accordingly.

(1) Program aims and learning outcomes

Concerning the development of the Bachelor study programs submitted for accreditation, several aspects were taken into consideration. Overall, these pertain to the current national demographic phenomenon (the considerable increase of the young population), as well as to the economic development recently taking place, and its subsequent cultural implications. Both the discussion with College management, as well as with the study programs representatives, pointed to the high demand for qualified personnel in the technical and medical fields. At national level, this need is most immediately present in the applied medical sciences fields. The establishment of internationally recognized study programs in the above-mentioned fields is a necessity in the context of the national demographic developments in Saudi Arabia. An effective health care system may only be implemented by offering the young Saudi population a high-quality education in the field of medical sciences. The members of the expert group believe that the accreditation of the study programs covered by the present report is contributing to the above-mentioned goals.

The expert group appreciates positively the fact that the majority of the graduates from the study programs has found employment in the respective field shortly after completing their study. On the one hand, this shows the high demand for qualified personnel. On the other hand, this indicates that the learning outcomes are clearly oriented towards the needs of the labour market. Moreover, this corroborates the need for the study programs submitted for accreditation, as some are unique in the Kingdom of Saudi Arabia, or even in the entire Gulf Region. The Vision and Mission of the College and the University are in this sense clearly formulated and transparently presented. Moreover, each study program submitted for accreditation responds to this general mission statement of the University with a comprehensible concept in which its particular Vision, Mission and Goals partake. The expert group rated this distinctive approach as above-standard in international context.

With these particularities in mind, and in relation to German and European standpoints, several queries arise. Study-program-specific questions arise, such as, for example, whether a recognized occupation requiring formal training is necessary for students prior to enrolment in the program. Such is the case in Europe in the field of dental hygiene, for example: the completion of an internship stage as a dental medical assistant is mandatory for gaining a qualification in the field. In this sense, the individual study program management provide more insight details to the expert group with regards to the Saudi educational system and its structure. The majority of the high-school graduates enrolls immediately at the University. This fact invariably causes difficulties at a structural level. The manner in which the University handles this aspect and the solutions it has developed are detailed under Criterion 2 - Curriculum Design.

In the context of the high educational standard aimed at by the University, questions arise, too. These pertain to a great degree to the contents, as well as the levels of the study programs. As the majority of the young Saudi population enrolls in universities, it becomes a challenge to maintain the present excellence

standard by Bachelor programs only. As both a medium- and long-term option, the expert group recommends the initiation of Master and PhD programs in the respective fields. These shall not only maintain but also enhance the distinctive, high-standard intended by the University. Moreover, such programs can secure research-related aspects in a more extensive manner than possible at undergraduate level.

The study programs submitted for accreditation are structured according to the following plan: the Preparatory Year (semesters 1 and 2 are common for all University students), the Core Courses (semester 3, common for all the students enrolled at the College of Applied Medical Sciences), the study-program specific courses (semesters 4 to 9) and the internship (semesters 10 and 11). The present expert report and the recommendations contained in it follow this structure accordingly.

The expert group endorsed the importance of the Preparatory Year and of the Core Courses (3rd Semester) specific at the College of Applied Medical Sciences. The clear goal of the first study year is to prepare young high-school graduates for the academic environment. In these initial stages students have the possibility to become familiar with particular contents related to the different study programs. At the end of the 3rd semester, according to their preferences and interests, students may decide upon one of the study programs available at the College. With regard to the contents of the Preparatory Year, it has been noticed that the 2nd semester contains subjects pertaining to organic chemistry. In this sense, the recommendation of the expert group would be to introduce at this level subjects pertaining to inorganic chemistry, as this is a prerequisite for routine clinical work and can be considered relevant for all study programs submitted in the present accreditation process.

The program-specific suggestions (semesters 4 to 9) of the expert group can be summarised as follows:

According to the expert group's opinion, the Bachelor study program "Biomedical Technology - Instruments" has been developed specifically for instructing students in the use and maintenance of technology in the fields of human disease therapy and diagnosis. The theoretical and practical information imparted has been appraised as adequately organised. In addition to this, the curriculum supplies for skills in related fields which enable undertaking numerous practical tasks. In the view of the expert group, the extensive practical training facilitates the adequate application of the theoretical basis.

In order to enhance the range of skills provided by the present Bachelor study program, it is suggested to put a greater focus on biophysical and biological sensor technologies. As subject matters, these are the basis of numerous diagnosis procedures. The introduction of courses from the fields of radiation protection and medical imaging is foreseeable. Such subjects shall ascertain the relevance of these fields and their interrelation, as well as their interdisciplinarity. To sum up, in the view of the expert group, the study program "Biomedical Technology - Instruments" and its contents are harmoniously constructed. The learning outcomes are clearly formulated and cover an important sector of health care. Thus, the study program responds in an excellent manner to the great demand for technically qualified personnel in the field of medical engineering in Saudi Arabia.

Overall – and pertaining to all Bachelor study programs submitted for accreditation – the expert group recommends initiating student-patient contact earlier in the study process. However, this should take place only under supervision of professional teaching and medical personnel. In this context, the exceptional spatial and technical facilities available in the laboratories of the Departments (see Criterion 4) make possible performing advanced clinical and medical tasks.

(2) Curriculum design

The general structure of the Bachelor study programs consists in the four previously-mentioned phases (see also (1) Program aims and learning outcomes): the "Preparatory year"(semesters 1 and 2), Core Courses of the College of Applied Medical Science (3rd Semester), the study-program specific courses (semesters 4 to 9) and the internship (semesters 10 and 11). The expert group regards this structure as extremely beneficial and well-oriented. Highly appreciated have been the Preparatory Year, and the later possibility to opt for the desired study program. The structure not only responds to the prerequisites of the Saudi educational system (and the high enrolment rate), but also enables students to make legitimate decisions with regards to their professional training, based on personal competencies and interests.

The study programs are designed as following: All Bachelor study programs are offered as full-time programs. They are divided in different courses, each comprising a different amount of credit hours (contact time). All study programs finalize with the awarding of the academic degree of "Bachelor of Science", irrespective of their focus. The expert group regards the Bachelor study programs as well structured and comprehensible. In this sense, they are comparable with similar study programs at international level in the specific fields. In addition to this, they provide the possibility to select different specialisations when pursuing higher education at graduate level and enrolling in Master study programs.

With regards to the curriculum, the expert group formulated a small number of recommendations. Their role is to assist the study programs in the enhancement and further development of the high-quality standard. These concern overarching educational aspects. In turn, these will enhance the efficiency of each study program.

As mentioned in the discussion with the student representatives, and meeting the opinion of the expert group, optional modules may gain an increased presence as part of the study-program-specific courses. As a medium-term strategy, this could enable students to gain more intricate knowledge in various areas of interest, or to enhance particular foci in their course of study.

As a both medium and long term strategy, the expert group proposes a stronger emphasis on the competencies to be developed within each study program. More precisely, the expert group recommends concentrating the courses in thematically-overarching modules. These modules can be understood as round, compact units, which relate to a common temporal and thematic reference point. Each module should comprise different teaching and learning methods (e.g. lectures exercises, internship, e-learning, research). In order to reduce the workload necessary for examination, it is recommended that each module finalises with a competence-oriented examination. The result of this evaluation should be also comprised as part of the final graduation grade for the respective student. The expert group recommends that the individual study time of the students is comprised in the module descriptions. In this manner, the entire workload necessary for students can be accurately estimated. Should it be the case, a guideline following the European Credit Transfer System (ECTS) could be implemented, alongside the national account for the credit hours (contact time and hours). Such guidelines and a corresponding equivalency system would facilitate student exchange possibilities at the King Saud University. In this context, the experts recommend to end up all the Study Programs with a final thesis focussing on the scientific skills a university study program should develop.

In addition to this, a more competence-oriented approach of the didactic concepts has been suggested, and, if the case, a more problem- and evidence-based adaptation of these concepts (Problem Based Learning).

As a final, overall strategy for enhancing the potential of all study programs, the expert group recommends maximizing the available resources available at both the College of Applied Medical Sciences and the King Saud University. In this sense, an increased focus on interdisciplinary and interdepartmental work, and resulting possibly in a later enhanced collaboration among colleges, would bring a positive contribution at all levels.

(3) Personnel

In evaluating the teaching and administrative personnel situation, the expert group highlighted the exceptional level of motivation. The dedication of the teaching staff pertains to all related issues, from tutoring to student support. From University and College management to professors and lecturers, the employed personnel reveals a great deal of commitment. It carries out and implements the study programs self-consciously, with high competences and with an outstanding level of professionalism. To sum up, the expert group believes that the study programs provide sufficient personal resources (both in qualitative and quantitative terms) to guarantee high quality teaching. As a particular characteristic, the expert group was impressed by the high degree of "Corporate Identity" amongst the representatives responsible for the study programs. From a qualitative point of view the high number of members of the teaching staff holding PhD-degrees is noteworthy. As previously mentioned, the expert group recognizes the significance of highly-qualified personnel and recommends on this basis the development of Master and PhD programs. On medium term, this shall contribute to the academization of the study programs submitted for accreditation and their respective domains of activity. The University shall thus be able to prepare internally-educated personnel at postgraduate level and simultaneously cope efficiently with the ever-increasing number of students.

The spatial, technical facilities and the financial situation of the University were evaluated as highly-above average by the expert group. These conditions enhance also the possibilities to conduct state of the art research. In order to maintain the already high quality standard and to maximize research results, the expert group encourages further collaborations with internationally-reputed experts in all related fields. By attracting research and teaching staff from outside the Kingdom of Saudi Arabia, the University can strengthen its position as a reputed institution at international level – beyond the Middle East and Gulf Regions.

As adjuvant strategy to attain the above-mentioned goals, the expert group suggests assimilating internationally-valid standards for employing teaching personnel. By integrating such criteria and adapting the existing ones, the University shall increase the transparency of the system from an external, international perspective. In turn, this strategy shall facilitate the employment of foreign teaching staff.

As a final point, the expert group encourages the further development of professional training options for the teaching personnel. In this sense, the university should continue to actively promote international exchange and networking and assist the teaching personnel in further developing their academic and research strengths.

(4) Facilities and learning resources

The College of Applied Medical Science of the King Saud University is divided into two main campuses: the female and the male one. Each campus, in turn, holds the following departments:

- Biomedical Technology
- Community Health Sciences
- Clinical Laboratory Sciences

- Dental Health
- Optometry
- Radiological Sciences
- Rehabilitation Sciences

The study programs submitted for accreditation are offered within the above-mentioned departments. Each department has available learning and seminar rooms fully equipped with computers, beamers and white boards. All computer equipment is up-to-date and WLAN is available in the buildings. Particularly impressive are the laboratory facilities in all departments alike and available for all study programs. The male campus in particular holds facilities and equipment which are most up-to-date from a technical point of view. The training rooms are excellently supplied, from equipment for biochemical examinations, physical-therapy-related equipment or computed tomography, and many more. In the context of possible sharing of equipment, the expert group welcomes the upcoming relocation of the female campus to the vicinity of the male campus. The financial support of the University offered to the College is highly appreciated.

Moreover, the College of Applied Medical Sciences holds a well-supplied, technically-related library; on -line access to different prestigious libraries and their databases is assured.

At University level, the expert group highly esteems the Prince Salman Central Library of the King Saud University. The Library contains numerous and varied resources publicly available for all the students of the University. The printed resources, as well as the online resources and databases provide students with a wide range of scientific and academic publications.

The numerous flat screens in the building provide slide shows of current events and activities taking place at the university. This enables students and teachers to strongly identify with the higher education institution.

The inspection of the facilities of the female and the male campuses at the College of Applied Medical Science revealed that the existing teaching and learning infrastructure holds an outstanding high quality.

Overall, the expert group is entirely positive that the qualitative and quantitative material and spatial resources guarantee the implementation of the study programs in the best manner, and contribute to the continuous development of the University.

(5) Study process and student assessment

All students must attend the introductory Preparatory Year of the King Saud University. As previously mentioned, this takes place before the study-program specific courses. During this year, students are closely overseen by the teaching personnel and thoroughly prepared for the demands and challenges each program may hold. Content-wise, the courses comprise basic, general knowledge and overarching topics. In view of these facts, the expert group evaluates appreciatively the entire first year and its implicit engaged student assistance.

Pertaining to the particular study programs submitted for accreditation, the expert group greatly acknowledges the support offered to students by the highly-committed teaching staff. The discussion with student representatives strengthened this opinion, as the students recalled most positive experiences during the course of study. Moreover, students appear eager to engage in the numerous activities offered by the College. By doing so, they simultaneously maximize the development potential the College holds.

From the viewpoint of the expert group, the workload of the study programs is appropriate for students and in relation to the volume of knowledge to be imparted. The positive outcome of the discussion led with the students revealed and consolidated this conclusion. All study programs are clearly structured and present clearly formulated outcomes. The requirements demanded for students

are described in a transparent manner. Based on the students' opinion, as resulting from the discussion with their representatives, the information provided regarding the study programs is reliable. In this sense, the weekly and semester schedules are realistic and attainable; students are timely informed on the evaluation procedures and receive all necessary assistance during their course of study.

With regards to the student examinations conducted during the course of study, the expert group suggests an increase in the skills-oriented type of examinations. This suggestion concurs with the already-mentioned recommendation to consolidate the individual courses in larger teaching units (modules – see (2) Curriculum Design). The expert group proposes thus presentations, project work or term papers as alternatives to the courses evaluated primarily by means of written examinations or tests. If possible, the assessment system of the study programs should be evaluated and validated by external independent experts in an over-arching assessment structure. Such a structure could serve the strong points of each program, as well as their respective development potential. Periodic examinations during the entire study process serves as a control of the learning progress. This is challenging and is associated with substantial workloads of all stakeholders involved. A positive contribution in this sense is the high level of motivation of the teaching staff. This conveys further at student level, and mirrors itself in the continual strong commitment on behalf of the students.

For the continuous development in the field "Study process and student assessment", the expert group encourages the growing receptiveness in international matters at the College of Applied Medical Sciences. The exchange opportunities available at the College and its Departments for the teaching staff and the students are highly welcomed. Nonetheless, the expert group identifies the possibility for further enhancement of the exchange system. In the context of differentiated cultural and regional particularities, a suggested alternative

represents short-term exchange programs, such as “summer schools”. This would not only attract students and teachers on all sides, but would also facilitate immediate cooperation and collaboration with international, foreign universities.

(6) Program management

In the view of the expert group the internal quality assurance system of the College of the individual study programs is well thought and professionally designed. Each department offers a “Quality Room” assigned for the systematic documentation of quality assurance information and for the appropriate implementation of the results. They provide the spatial facilities for the related relevant documentation for each study program in matters of quality management and control. The rooms maintain all documentation pertaining to the development and implementation of the study programs, from course and teaching evaluations, to general quality assurance information. An equivalent system exists in electronic form, a fact, which avoids complex paper-work and facilitates the search for and location of needed information. In this sense, the “Quality Rooms” and its personnel can be regarded as the core of the quality management system at the College. In the view of the expert group, the present quality assurance system implemented at the College – though extremely laborious and detailed – functions strictly objective-oriented. This target-strategy is of utmost benefit for the quality-enhancement of the corresponding study programs.

The expert group resonantly encourages the refinement of the present quality assurance system into an exhaustive structure. In time, steps taken in this direction shall result in further enhancements visible at all levels. For this continual development, the expert group regards the data compiled as part of the quality management system relevant for triggering further development possibilities at the College and the University. By such means, even those

decisions initially deemed as unconventional may gain a positive light and be presented transparently and objectively. Moreover, the data gathered in the framework of the quality system can effectively summarize the evolution and goals of the College and the departments. Such a contribution makes, in the view of the expert group, each study program approachable from an external standpoint (e.g. by providing numbers pertaining to graduate, or enrolled students, alumni etc.).

The management structure of each study program submitted for accreditation is also highly esteemed by the expert group. Here, too, is to be identified a similar target-oriented approach, and a clear strategic plan. All the processes involved in the study programs are clearly and transparently presented, for students and teachers alike. The admission requirements, as well as the graduation requirements are attainable from both the students' and prospective applicants' part.

Summary

The expert group recommends the unconditional accreditation of all Bachelor study programs submitted by the College of Applied Medical Sciences to the Accreditation Commission of the AHPGS. In the view of the expert group, all study programs submitted for accreditation fulfil the Accreditation Criteria to a substantial or full amount. The strengths of the college are the relevant, outcome oriented study programmes, the excellent programme structures, the committed staff and students, the outstanding facilities, the clear student admission, the fine student support, the good programme management and the coherent and effective internal quality assurance system. It is evident that the College is prepared not only for national but also for regional and international leadership. Moreover, the study programs respond to the emergent need for qualified professionals in the applied medical field in the Gulf Region.

In order to further enhance the quality of the college and its study programmes the following recommendation are set up:

Programme specific recommendations are outlined in Criterion 1 of this report, they are not repeated here.

In addition to the study-program specific recommendations, the expert group has also formulated the following general, over-arching recommendations.

(1) Program aims and learning outcomes:

- On the medium term, the introduction of Master and PhD programs should be considered. They should be built upon the existing Bachelor programs and should offer learning at higher academic levels.
- Research should be extended at the College, maximizing the benefit of students on all levels of education. A clear internationalisation strategy might help to build up strong research networks with partners within and outside Saudi Arabia.
- The opportunities emerging from an interdisciplinary approach should be further exploited. For that purpose a strong, target-oriented collaboration between the various departments of the College is encouraged. This holds also true for collaboration with other departments of the King Saud University.

(2) Curriculum design

- It is proposed to initiate student-patient contacts as early as possible in the curriculum. Patient attendance strategies and supervision may be adapted to meet this precondition.
- An extension of the optional courses available during the study period is suggested. This concerns especially study-program specific parts, as it represents a way for students to further develop their strengths in a more specialized area of the field.

- A clear competence-oriented strategy for all study programs is suggested. In this sense, the courses may be compiled in overarching modules, which articulate the competencies to be developed by the students during the module. The adjoining exams may also follow this goal and evaluate its achievement.

(3) Personnel

- The co-optation of internationally reputed and associated personnel is suggested as a future approach. This suggestion pertains to all study programs and shall aid in strengthening the University's position and recognition in the international context.
- With regards to the teaching personnel, the selection criteria should be adapted to meet with internationally established standards and practices.
- The future strategy for the continuous professional development of the faculty might be oriented toward an enhancement of mobility of teachers. As a result, the internationality of the study programs will be enhanced, as will the teacher interaction at international level.

(4) Facilities and learning resources

- The expert group welcomes the upcoming relocation of the female campus and, along with this, the ongoing modernization of the corresponding material and technical resources and the exchange/sharing of equipment with the male campus

(5) Study process

- An extended mobility and international connecting for the students enrolled in the programs is encouraged. Summer Schools offered at King Saud University or elsewhere may offer a viable solution to foster international experiences of students and staff.
- An external assessment (validation process) of the examination system may enhance its efficiency and effectiveness.

(6) Program management

- The data collected in the frame of the internal quality management system should be more widely used. In this sense, this data may assist not only the further development of the study programs, but also for the steering of the College and of the University.

7. Decision of the Accreditation Commission from the 15.12.2011

The decision of the Accreditation Commission is based on the University's Application documents, the Expert Report, which covers the written expert reviews and the results of the On-Site Visit, as well as the University's Response Opinion to the Expert Report. The On-Site Visit took place from 30.09.2011 until 02.10.2011 at the King Saud University, College of Applied Medical Sciences, Riyadh, Kingdom of Saudi Arabia.

The Accreditation Commission of the AHPGS has discussed the procedural documents and the vote of the expert group.

The Accreditation Commission of the AHPGS reached the following decision:

The full-time Bachelor program "Biomedical Technology - Instruments" is to be completed with awarding of the academic degree "Bachelor of Science" (B.Sc.). The standard period of study is eleven semesters. The total study time amounts to 5015 hours. This is divided into 3015 contact hours for the theoretical part of the study program, and 2000 hours assigned for the internship.

The Accreditation decision is based on the Accreditation Criteria developed by the AHPGS in close accordance with the existing criteria and requirements valid in the Federal Republic of Germany and based on the "Standards and Guidelines

for Quality Assurance in the European Higher Education Area”, established by the European Association for Quality Assurance in Higher Education (ENQA).

These Criteria cover the following six main domains:

1. Program aims and learning outcomes
2. Curriculum design
3. Personnel
4. Facilities and learning resources
5. Study process and student assessment
6. Program management

The AHPGS Accreditation Commission considers that the above mentioned Accreditation Criteria are fulfilled without conditions. The AHPGS Accreditation Commission accredits the study program for the duration of five years, until the 15.12.2016.

The study program specific recommendations, as well as the overarching recommendations, formulated in the Expert Report are to be taken into consideration.

Freiburg, 15.12.2011