

## **Accreditation Report**

**German University in Cairo**

**Biotechnology (B.Sc./M.Sc.)**

### **I. Procedure**

**First accreditation Bachelor program:** March 24th, 2006 **through:** ACQUIN **until:** March 31st, 2011, extension of the accreditation (end of study year) until September 30th, 2011

**Extension of accreditation after submission of the self-documentation:** September 30th, 2012

**First accreditation Master program:** June 26th, 2007 **through:** ACQUIN **until:** September 30th, 2012

**Date of contract:** July 27<sup>th</sup>, 2011

**Receipt of self-documentation:** September 1st, 2011

**Date of the on-site visit at the GUC in Cairo:** May 13-14, 2012

**Standing expert committee:** „Mathematics/Natural Sciences

**Attendance by the ACQUIN head office:** Marion Moser

**Accreditation Decision:** September 27<sup>th</sup>, 2012, September 24<sup>th</sup>, 2013

**Members of the expert group:**

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- **Dr. Frank Niehaus**  
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The evaluation report of the peer group is based on the self-evaluation report of the higher education institution and extensive discussions with the head of the study programs, staff representatives and students.

## **II. Initial Status**

### **1. Short profile of HEI**

The German University in Cairo (GUC) was founded in 2002. It is an Egyptian private university and is established under the patronage of the University of Ulm and the University of Stuttgart.

GUC opened its gates to students in October 2003 and consists of seven faculties: the Faculty of Pharmacy and Biotechnology, the Faculty of Engineering and Materials Science, the Faculty of Information Engineering and Technology, the Faculty of Management Technology, the Faculty of Media Engineering and Technology, the Faculty of Postgraduate Studies and Scientific Research, and the Faculty of Applied Sciences and Arts. For the future the establishment of a Faculty of Basic Sciences and of a Faculty of Human Sciences and Languages is planned.

The GUC wants to be a centre of excellence in teaching and research that will serve diversified constituencies and evolves as a model for higher education. So the GUC provides a high quality state-of-the-art education which meets the needs of the students, employers nationally and internationally. The GUC develops also its position as a leader in selected academic programs and in scientific research.

The teaching language is English, while German is taught in addition to allow the exchange of GUC students with other German universities and to facilitate their training in German companies.

In order to establish international compatibility and to facilitate academic recognition according to European standards, the European Credit Transfer System (ECTS) is used at the GUC.

At the time of the self-evaluation (Sept. 2011), 7741 students were enrolled in the undergraduate programs at the GUC. The first students graduated in October 2007. Until Sept. 2011, 4134 students have graduated from the undergraduate programs. The number of students in the admission intake is increasing, the first admission intake in 2003 was 956 students, in 2011 1975 students. This shows the high reputation and attractiveness of the GUC.

### **2. Embedding of Study Programs**

The Bachelor and Master programs in "Biotechnology" are offered by the Faculty of Pharmacy and Biotechnology. The first enrollment in the programs took place in 2003/2004. The Bachelor study program "Biotechnology" (B.Sc.) was accredited on March 24<sup>th</sup>, 2006 and the Master study program "Biotechnology" (M.Sc.) on June 26<sup>th</sup>, 2007 with conditions. The fulfilment of the

conditions was approved by the accreditation commission of ACQUIN on June 26<sup>th</sup>, 2007 (Bachelor program) and September 23<sup>rd</sup>, 2008 (Master program). No additional recommendations were given for the programs.

In addition to the Bachelor and Master programs, a Ph.D. program is offered to the students at the GUC, which follows the Ph.D. procedures in Germany.

### **III. Evaluation**

#### **1. Objectives**

The GUC has defined general educational objectives for its students: Students should receive an excellent education in accordance with scientific and technologic state-of-the-art standards which enables them to keep up scientific developments and to work interdisciplinary. The GUC graduates should have problem solving skills, social competences, should be open minded, responsible as well as able to criticise, communicate and cooperate to be prepared for the rapidly changing and culturally-diverse working life.

The GUC has also defined clear subject related objectives for both study programs:

The Bachelor graduates should have "a solid practical and theoretical knowledge in the field of Biotechnology", they should be "able to cultivate, use and modify microorganisms for research and application", they should have "an understanding of engineering, marketing, economic and legal issues involved in application of Biotechnology and utilization of its products" and they should be able to continue with a postgraduate program in Egypt and internationally (self documentation part III, page 3-4).

The Master graduates should have "an in-depth understanding of the fundamental scientific principles in the field of theoretical and applied Biotechnology" (self documentation part III, page 4), should be able for independent research work and to continue their education in a PhD program.

The Bachelor and Master program in Biotechnology are in addition to the study program Pharmacy the second discipline offered in Sciences at the German University in Cairo (GUC). Both disciplines and their related programs are organized within the Faculty of Pharmacy and Biotechnology and are closely connected.

Biotechnology is defined by the European Federation on Biotechnology (EFB) as the *"Integration of natural sciences and engineering sciences in order to achieve the application of organisms, cells, parts thereof and molecular analogues for products and services"*

The different "colors" of Biotechnology include:

RED BIOTECHNOLOGY: Medicine / Pharmaceuticals

- Gene therapy
- Production of proteins, antibodies, and vaccines
- Tissue engineering

WHITE (Industrial) BIOTECHNOLOGY: Chemical industry

- Basic chemicals

- Biopolymers
- Biorefinery

#### GREEN BIOTECHNOLOGY: Agriculture

- Crops improvement
- Natural pesticides
- Pest and disease resistance

#### GREY BIOTECHNOLOGY: Environmental

- Purified water
- Analytics of pollutants

#### BLUE BIOTECHNOLOGY: Water based

- Use of marine organisms

Despite the fact, that at present the biotech business respectively industry in Egypt is very small, the peer group regards all aspects as relevant for a Biotechnology program taught at the German University in Cairo.

Obviously the color code of modern biotechnology is getting more and more complex and knowledge increased exponentially in the last decades. Therefore it is evident to not only harvest the findings of different natural science faculties but to create an interdisciplinary platform, which can satisfy the demand for a functioning network. Modern biotechnology is capable of closing the gap between academic and industrial demands bringing together scientific and technical approaches.

It has to be emphasized that, according to the list above, the worldwide biotechnology research and business development is not at all restricted to pharmaceutical issues but became an interdisciplinary billion dollar market targeting the whole spectrum of natural science and engineering disciplines.

There is an increasing demand of scientists and engineers with various expertise in the feed, food and agro industry, the biofuel/bioenergy and the home and personal care business, the utilization of renewable resources regarding the development of biobased polymers and the wide cluster of bulk, fine and special chemicals produced by biocatalytic processes or enzymes itself as products. Biotechnologists in these areas require profound knowledge in disciplines like:

- molecular and microbial technologies
- protein purification and engineering skills
- process and environmental engineering

- systems biology and metabolic engineering

According to the documents provided by GUC and information given to potential students, the Biotechnology program should cover the broad spectrum of “colors” in Biotechnology. However, at present, the biotechnology program at GUC focuses mainly (i. e. approximately 95%) on “red aspects”. Despite the fact that several lectures of other disciplines are mentioned as electives in the curriculum, obviously not all of them are offered nor selected by the students. It is recommended, that lectures and practical courses covering all aspects of biotechnology are actually offered to the students.

The defined objectives of the study programs are valid and formulated in a clear way. They are also in accordance with the German and European qualification framework and students acquire good general and specialised knowledge which will enable them to take up a qualified employment. Besides the technical and scientific competences the personal development of the students is promoted also. Students should be able to take over responsibility in the society and to critically reflect and question the acquired knowledge.

The Faculty Pharmacy and Biotechnology has 450 study places per year, which is fixed by Egyptian authorities. At present (2007 – 2010) 13 students are enrolled in the Biotechnology program of the faculty (numbers from self-evaluation report, Part III, page 7). The drop-out rate of the students is very low (4.8 %), up to now only 3 out of 62 students left the program. A high percentage of the students (about 80%) finish in the regular study period which shows that the programs are well structured and can be accomplished within the regular study period. The reason is first the well elaborated admission procedure which currently allows only the best applicants to start studying at the GUC. Second, students in need are advised very carefully. Also the first semester could be seen as leveling process for the different prerequisites of the beginners. The average graduation score (GPA) is 1.98, which is very good.

Still the interest in the Biotechnology program is not as high as it is for the Pharmacy program due to the current employment situation in Egypt. The biotechnology industry in Egypt still develops and the employment perspectives for biotechnology graduates are currently much better in the pharmacy sector.

Students enrolled in the Biotechnology programs are aware of this critical situation of employment in Egypt. Despite the fact that the positions in Egypt are limited so far, they decided to study Biotechnology at GUC and are planning to search for employment or PhD positions outside Egypt. Students who look for a safe position in Egypt are preferentially studying Pharmacy at GUC.

The low number of students in the Biotechnology program leads to the situation, that the Biotechnology students have to share the courses with the Pharmacy students, so especially for those students who plan a career in biotechnology as defined above, it is extremely disappointing

to share the courses with pharmacy students and have therefore more a profile towards pharmaceutical biotechnology. Since title and curriculum have been just accredited by the Egyptian authorities, the process for a change to e.g. "Pharmaceutical Biotechnology" would be extremely time-consuming and possibly expensive too.

### Selection of Students/Target Group

Admission to the Biotechnology Bachelor of Science program is - as is admission to any other GUC Bachelor program - only granted to persons either having an Al-Thanyweya Al-Amma, IGCSE and GCSE, American diploma or German Abitur or to applicants who can proof an equivalent degree of education. Generally the admission requires credentials like the Secondary School Certificate, partly with some additional requirements. Independent of the type of certificate students have to pass both a reasoning test and a GUC-specific English test to ensure that students can cope with GUC mainstream lectures. Tests and examinations are internet-based and randomly generated for every individual applicant. Interviews are offered if required. The admission procedure is reasonable and secures the quality of the study programs.

Impressively, GUC can choose between the best high-school graduates all over Egypt. For example: in the year 2011 the GUC received 11351 applications for all degree programs. Out of these 9976 candidates fulfilled the entrance requirements, and finally 1975 students were accepted for a course of study. As far as Pharmacy and Biotechnology (PBT) courses are concerned an average of about 2600 applicants apply for admission per year (2003-2010) of which about 15 % are accepted. 54 % of the accepted applicants are females. Concerning the Biotechnology program an average of less than 7 students enrolled for the Biotechnology program (BT) per year as compared to about 400 for the PBT course.

A prerequisite for the admission to the Master program Biotechnology is a Bachelor degree in Biotechnology. Currently only internal applicants get admission to the GUC Master program. If the Master degree and the importance of research oriented education is also recognized by Egyptian authorities, the interest in the M.Sc. program will increase. Also then it makes sense to open the access to external applicants from outside the GUC. This would be also important to handle the competition by the American University, also offering a M.Sc. in Biotechnology.

According to the GUC Transfer Admission Policy the BT program allows the admission of a small number of transfer students from Egypt and from abroad.

## 2. Concept

The study programs are completely modularized and (with one limitation, see below) organised in accordance with the relevant criteria of the Bologna process and the regulations of the Accreditation Council (Akkreditierungsrat) and the Common Structural Guidelines of the Laender for the Accreditation of Bachelor's and Master's Study Courses (*Resolution of the Standing Conference of the Ministers of Cultural Affairs (KMK)*). The GUC uses the ECTS system, one ECTS-point is equivalent to 30 h of student's workload. The size of the modules is mainly 5 ECTS-points and more, there are also a few modules with a smaller size. Modules smaller 5 ECTS-points are e.g. language courses (3 ECTS-points, (revised curriculum)) also the small modules are evaluated by the peer group as reasonable. Some modules are also awarded with half credits (e.g. 7.5) For the peers it seems to be difficult to measure the workload of the students exactly up to 15 h (= 0.5 ECTS-points). So it is recommended to use only whole-number ECTS-points.

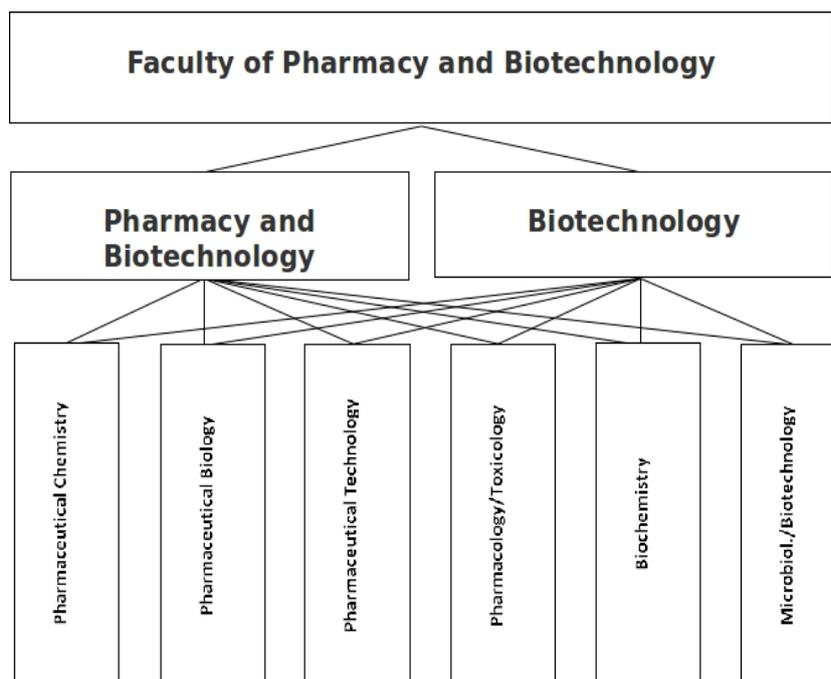
GUC awards Bachelor of Science, Master of Science and Doctoral Degrees taking account of the international and Egyptian profiles and standards. An important character of the Egyptian education system is that there are six studying days per week. Summer courses of four weeks duration are offered.

### Overall Structure

The programs "Biotechnology" offered by the Faculty of Pharmacy and Biotechnology at GUC have been designed in cooperation with the patron universities in Ulm and Stuttgart. The Bachelor program consists of 8 semesters which take 4 years to complete. The first semester of the Bachelor program can be seen as a "foundation semester" to harmonize the knowledge of the students. In addition, the Faculty of Pharmacy and Biotechnology is offering an International Master of Science in Biotechnology. The Master program lasts for three semesters. The Biotechnology program was optimized and modularized with a view to fit into the context of the teaching activities and competences of the Faculty of Pharmacy and Biotechnology at GUC. The courses have access to all institutional, administrative and infrastructural facilities GUC offers. Designed as a consecutive Bachelor/Master program, the Master program recruits its students from the GUC Biotechnology Bachelor course. So far only few students have been enrolled in the Master program.

According to the homepage of the GUC the Biotechnology program offers the following specialties: Medical Biotechnology, Environmental Biotechnology, Bioprocessing, Marine Biotechnology, Pharmaceutics, Industrial Microorganisms and Agricultural Biotechnology. As a result of the structure and organization of the Faculty of Pharmacy and Biotechnology with its two courses "Pharmacy and Biotechnology" (PBT hereafter) and "Biotechnology" (BT hereafter) (Fig. 1) the curriculum of the Biotechnology program is currently biased towards pharmaceutical aspects of biotechnology. The GUC stated that currently the employment possibilities of the graduates are much better in the pharmacy sector than the biotechnology sector and therefore the focus on

pharmaceutical biotechnology would increase the employment possibilities of the graduates. For a better reflection of the title of the study programs both classical and modern biotechnology aspects should be integrated to a larger degree. This would strengthen practice-oriented teaching in core competences in biotechnology. The pharmaceutical biotechnology aspects should be shifted to the elective modules.



**Fig. 1.** Concept and cross-linking of teaching activities as a result of the structure of the Faculty of Pharmacy and Biotechnology at GUC

According to the KMK requirements for the accreditation of Bachelor and Master study courses a Bachelor should last six to eight semesters and a Master program two to four semesters. Consecutive Bachelor/Master courses should not last longer than 10 semesters in total. However, the German Pharmacy program is still organized differently. After four semesters a first state examination is accomplished. Another four semesters are necessary to qualify for the second state examination and a practical year completes the program and is certified by the third state examination. The Egyptian system differs in that in the Pharmacy programs ten semesters have to be accomplished at the University. These frames impair harmonization and synchronization of PBT and BT programs at GUC.

#### Bachelor and Master Program

According to the homepage of the GUC the Biotechnology program offers the following specialties: Medical Biotechnology, Environmental Biotechnology, Bioprocessing, Marine Biotechnology, Pharmaceutics, Industrial Microorganisms and Agricultural Biotechnology. As a result of the structure and organization of the Faculty of Pharmacy and Biotechnology with its two courses "Pharmacy and Biotechnology" (PBT hereafter) and "Biotechnology" (BT hereafter) (Fig. 1) and the low number of students in the Biotechnology course the curriculum of the Biotechnology program is currently biased towards pharmaceutical aspects of biotechnology and therefore both classical and modern biotechnology aspects should be integrated to a larger degree. This would strengthen practice-oriented teaching in core competences in biotechnology. The pharmaceutical biotechnology aspects should be shifted to the elective modules.

In the first semester the Bachelor curriculum imparts basics in biology and chemistry as well as language skills in English and German and applied mathematics. The second semester completes the basics in biology, extends the language skills and imparts background in physics. The more specific modules are biased towards pharmacy and focus on history and terminology in pharmacy, medicine and biotechnology. An important, sufficiently large module provides knowledge and practical skills in analytical chemistry. The third semester again extends the language skills and otherwise procures rather pharmaceutical knowledge, such as pharmacognosy, physiology and anatomy, and pharmaceutics. One may doubt whether these particular topics are really important for the BT program. Maybe other modules should be created for this program instead. Such as basics in chemical engineering, molecular biology or genetics. The other modules complete the scientific background. One may wonder why "Organic Chemistry" appears only in the third semester. The fourth semester completes the language skill courses and contains the first "Biotechnology" module, again providing more specific knowledge in pharmacy than in biotechnology. Presently PBT and BT students share the same courses in the first four semesters. Afterwards the groups are split. After four semesters a final decision is needed to follow the PBT or the BT program. Biotechnology modules can be accessed by Pharmacy and Biotechnology students as electives. In average 50 out of 400 of Pharmacy students take Biotechnology modules as electives per year.

After the fifth semester the curriculum bifurcates into more specific PBT and BT branches. The fifth semester deepens the knowledge in analytical methods as well as organic chemistry, biochemistry and physical chemistry. For the first time an "Elective" can be chosen. The sixth semester is a very strong semester procuring knowledge in applied and basic biotechnology. The seventh semester offers three "Electives" and hence specialization and has otherwise a focus on molecular microbiology and genetics. The eighth semester has its focus on applied biotechnology including electronics. The Bachelor thesis (12 ECTS-points) also has to be conducted in this semester. In the past 5 years also more than 20 percent of the students travelled to Germany to attend transferable courses, improve their language skills and accomplish their Bachelor theses.

Basically the structure is progressive and logic. Several modules, however, are not necessary for BT *sensu stricto* but are concessions to the two-tracks approach. Not all topics seem to be relevant (e.g., pharmacognosy, terminology) for the Biotechnology Bachelor program. However, several curriculum changes which are well documented have been made in the past years (removals, additions, shifts from regular to elective) and these efforts are acknowledged. A further optimization and condensing may become necessary, i.e. less “Electives” with a focus on the most popular ones (Cell Biology, Biosafety, Genetics and Genetic Engineering, Industrial Biotechnology, etc.). Integrated in the curriculum is an internship training in industry which should give the students the possibility for first practical professional experiences in their specific fields. Here the students can apply their knowledge in real “work life” and through the internship first contacts with the labor market are built up. In finding an internship placement the students are supported by the Student Career & Alumni Development Office (SCAD). Students have also the possibility to split the internship in several blocks, one block should not be less than 4 weeks. For the obligatory internship no ECTS-points are currently awarded to the students so far. This has to be changed. If the internship should be still obligatory ECTS-points have to be awarded.

Terms abroad are well and firmly integrated in the concept. For example, BT students received fellowships to Heidelberg University, students were sent to University Ottawa (Canada), MDC Berlin (Germany), University of Exeter (UK), Nottingham Trent University (UK), TU Hamburg (Germany) for Ph.D. and M.Sc.

The Master program Biotechnology is consecutive to the Bachelor program and consists of 11 compulsory modules. Students have also to choose one elective area with 19.5 ECTS-points out of three (Advanced Protein Biotechnology, Pharmaceutical and Medicinal Biotechnology, Applied Biotechnology, Bioproduction). Integrated in the program is also an internship which can be carried out in industry or in a bioscience institute. The last semester is dedicated to the Master thesis (30 ECTS points). Its has to be mentioned that the ECTS-points have to be adjusted for the Master program – the sum of credits out of the compulsory and elective modules is 88.5 ECTS-points, there are 1.5 ECTS-points missing, this has to be corrected.

Taking into account that the Master program is composed of three semesters to achieve an International Master of Science in Biotechnology this sums up to eleven semesters, i.e., showing non-conformity with the Bologna requirements, if the Biotechnology programs are indeed considered consecutively. The duration of more than ten semesters may be required in cases where

- i) the knowledge among a cohort of students starting in a specific program are not as equal as it should be. Considering the different educational background of students applying for PBT and BT an additional semester may be advisable.
- ii) certain courses are compulsory for any Bachelor/Master degree in Egypt or specific for the GUC philosophy (e.g., German language skills).

The Egyptian law demands that an Egyptian Bachelor study program in Pharmacy has to last five years in order to work as pharmacist in Egypt. A Master degree is not mandatory. The strong linkage between the "Pharmacy and Biotechnology" program and the "Biotechnology" program is a hurdle for synchronization with the European system and has to be realized and dealt with. The Bachelor degree which is compatible with the European system and basically enables the diploma holder to work in European companies seems to be not sufficient for Egypt. Therefore, the Master program has to be considered consecutive together with the Bachelor degree providing an academic package to fit with the Egyptian demands.

The consecutive Bachelor/Master program in BT exceeds the KMK requirements by one semester. One may use the arguments listed under i) and ii) to justify the extended program. It has to be admitted that students start with different background and capabilities which holds, however, true also for students in Europe. On the other hand extended lecture cycles do not necessarily provide synchronization of knowledge. Extensive summer school programs may instead be used to fill gaps in specific areas. The group of experts feels that the cross-linking with the PBT program and its courses also accounts for the extended study time. The BT students themselves are in favour of an earlier bifurcation and separation from the pharmacy courses in order to gain more specific knowledge in biotechnology at an earlier stage of the BT program. Because of the strong connection between Pharmacy and Biotechnology programs, the biotechnology study courses (B.Sc. and M.Sc.) in the present form are still a compromise between Egyptian and European regulations.

Hence, attempts should be made to redesign the consecutive Bachelor/Master program in order to better concert with the European, especially the German, system. If GUC students wish to proceed their academic education in Germany they face the problem that they have already accumulated more semesters than an average German Bachelor but have to spend more semesters for a Master program than would be necessary at GUC. Though "consecutive" in their studies they may end up in an "eight-plus-four" situation in order to meet the Egyptian law demands and fit to a standard European four semester Master program. In this context it might be advisable to accommodate an entry semester for all students who do not have sufficient knowledge for starting immediately with the Bachelor program (e.g., basics in physics and mathematics).

Even considering that there are formal legal guidelines and limitations for Egyptian study programs further measures should be taken to keep study times as short as possible and compatibility with the European system and the KMK guidelines as high as possible. The present situation may discourage students to go abroad for completing a consecutive Master (eight semester in Egypt, four semester in Germany) while competing with e.g. Egyptian Bachelors in Pharmacy of the ten-semester system after their return to Egypt. On the other hand, an eight-semester Bachelor may not succeed when applying for a European Ph. D. program.

### Methods of Teaching (both Study Programs)

As methods of teaching lectures, practical courses, exercises, project work are used. Through the lectures students should get a broad overview and in the practicals and exercises students will develop their technical skills and apply the techniques and theories they have learnt in the lectures. The teaching methods are appropriate for the teaching program.

### ECTS, Modules, Educational Objectives

According to KMK regulations a student should acquire 180 to 240 ECTS credits for the Bachelor with one credit point accounting for a workload of 30 hours. The Bachelor program consists of 50 modules, 45 compulsory modules and 5 elective modules.

Initially, the workload was too high (253.5 ECTS-points) and not distributed equally over the semesters especially semester three and four showed a high workload for the students with 37.5 and 35 ECTS-points respectively. But meanwhile this has been optimized also with regard to the overall curriculum that had to be adjusted to approach the 240 ECTS KMK recommendations. The new proposed curriculum shows 240.5 ECTS-points. The workload in the first four semester of the Bachelor program is now 30 ECTS-points/semester. For the peers it seems to be difficult to measure the workload of the students exactly up to 15 h (= 0.5 ECTS-points). So it is recommended to use only whole-number ECTS-points.

Module descriptions for all modules are available. Module descriptions contain information about module code, no. and title, prerequisites, course content (theory and practical), module outcomes, no. of credits, no. of lecture hours, teaching methods, references and textbooks and examination methods. In some cases the references are not up-to-date, here the reference list should be updated. The updated literature should be then also available in the library.

The ECTS distribution does not always seem to be well-balanced. For example, the ECTS of practical courses with many contact hours should be less than that for lectures with a high portion of self study time. Also students stressed that some of the courses are overloaded. On the other hand some tutorials are regarded as dispensable since the courses they are related to are "simple". The workload of the students has to be described in contact hours and self study time (see also the revised module descriptions of the study program "Pharmacy") in order to be able to evaluate the meaning and justification of ECTS distribution and workload. It has to be mentioned that the GUC evaluates also the workload of the students and first adjustments already took place.

The achievement aims and educational objectives of the programs have to be evaluated in the light of the claims on the Department's homepage:

"A sound fundamental knowledge in the basic biological concepts ...": YES – but with a strong bias towards classical aspects of pharmacy.

"... and their application and analysis in at least one of the following specialty areas: Medical Biotechnology, Environmental Biotechnology, Bio-processing, Marine Biotechnology, Pharmaceuticals, Industrial Micro-organisms, Agricultural Biotechnology.": YES – appropriate electives and modules are offered.

"The basic lab skills to carry out a broad range of experiments applicable to biotechnology.": MAYBE – the team of experts has not seen the lab facilities to carry out "a broad range of experiments". The students mentioned more sophisticated instrumentation is demonstrated only.

"The skills to conduct applied research at advanced level in the area of biotechnology.": MAYBE - the students complained about the "mass effect" experienced, i.e., they feel that the students of a small program do not have full access to methods and lab facilities and they experience or at least feel a lack of practical courses..

"The ability to develop hypotheses, design approaches to test them, and interpret the data from those tests to reach valid conclusions.": YES.

"Close relationship and acquaintance with the industrial practice in the field of Biotechnology." EMERGING – e.g. Sedico: GUC staff as consultant house in producing Erythropoietin for the first time in Egypt and the Middle East; EVApharma: involved in a conference on "Biosimilars" at the GUC June 2012; Rhein-Minaphar offers internships and job opportunities.

"A range of transferable skills including independent thinking, problem solving and team working":YES.

"An ability to communicate clearly and concisely in written and oral formats with professionals in the field as well as with laypersons." YES.

"An ability to work in a multicultural environment as a member of a multidisciplinary team to achieve objectives." YES – this is the very GUC concept!

"Ability to pursue further studies and research nationally and internationally in the field of pharmaceutical science." CONCEPTIONAL DOUBTS – The main goal should of course be in the area of biotechnology! Maybe a typing error?

In general, curricula, courses and classes, the teaching methods applied and organization of examinations are of high quality. With the few exceptions and concerns already addressed (stronger focus of the program towards all aspects of Biotechnology) the structure of the programs is logical and ensures a step-by step deepening and enhancement of relevant knowledge.

### **3. Implementation**

#### Resources

During the discussions with professors, associate professors, senior assistants and assistants in the Faculty of Biotechnology and Pharmacy it became obvious, that the teaching staff is very competent and highly engaged in the education of the students. The team is highly motivated to contribute to the overall targets of the university. This holds for the Egyptian and for the Non-Egyptian staff members. With the current teaching staff within the Biological Science Group the programs and the defined aims can be achieved. In the education of the Bachelor and Master Program "Biotechnology" (B.Sc./M.Sc.) 30 professors and lecturers are involved, they are also involved in the 'Pharmacy and Biotechnology' program.

At the GUC no tenure positions are available, but the staff contracts hold initially for three years and may be renewed then. For the professional training several possibilities exist, for example further qualification in soft skills and computer software. The teaching load of the professors amounts to eight hours per week and lecturers take twelve hours, which is adequate for the programs.

The Faculty of Biotechnology and Pharmacy has a well defined strategy and vision in teaching, but in research the vision seems to be not clear. So far the evaluators do not really see a strategy for implementing an internationally recognized research profile. A coherent research strategy is needed and more resources (e.g. time) should be invested in research.

There is no basic budget for research. Each professor has to apply for money for consumables and investments to the university president and the university founder. In order to allow independent research, it is highly recommended that each professor has an own basic budget for research. Furthermore, third-party funds are quite low, but may be increasing. The peer group suggests integrating applied sciences in biotechnology for the production and/or fermentation of natural products (e.g. insulin). The process of recruitment and developing strategies for research and teaching should benefit from this. Altogether, the peer group strongly encourages and recommends strengthening the research activities of the faculty, so that it can influence the study programs to a much greater extent. Therefore, the environment to foster a better research should be created (e.g. budget).

The GUC possesses an excellent state-of-the-art IT infrastructure. These facilities are also used to support all the processes concerning the application and admission of the students.

The ample laboratories at the faculty are used for the practical courses in the "Biotechnology" program as well as the "Pharmacy and Biotechnology" program. This was especially criticized by the biotechnological students. They would like to have more specific biotechnological experiments in their study program. Furthermore, the same laboratories are used for research and for the practical courses, whereas the research equipment can be used by the students only in limited extent. The peer group recommends, to provide own lecture rooms, laboratories and technical

equipment for the biotechnological study program. This would certainly increase the attractiveness of the program and the identification of the students with the study program.

### Cooperations

Due to the joint contract agreement between the GUC and the University of Stuttgart and the University of Ulm reasonable teaching cooperations are present. It is planned that every student at the GUC gets the possibility to do an internship (e.g. one semester) in Germany, which should be extended also to German universities other than those of Ulm or Stuttgart. It is obvious, that after their graduation at the GUC, the majority of the students find a position abroad. In Egypt, biotechnology is not a major subject of employment. Due to the political situation in Egypt the number of biotechnology companies is quite limited. An increase of the biotechnology sector in Egypt would be of advantage for the "Biotechnology" program of the GUC (e.g. for bachelor theses, participation in applied science, practical courses, internships).

During the accreditation process contact with industrial representatives revealed a substantial lack of visibility regarding the sheer existence of a non-pharmaceutical biotechnology program at the GUC. Here lies a great potential to increase the general conspicuousness of the study department. Successful internships and external bachelor- and master theses are an excellent focal point for the induction of industrial research efforts, which in turn will have effect on the employment situation in the wide area of industrial biotechnology in Egypt.

Nevertheless, Rhein-Minapharm Biogenetics in Cairo is an established biotechnological company and contacts of the GUC to this company are already made and should be increased. In general, contacts to the biotechnology industry should be enhanced especially for the internship placements of the students. This could also be done through cooperation contracts e.g. with European associations like the DECHEMA and/or the Egyptian industry.

### Examination System

The examination system of the GUC is well organized. Having established a Standards and Assessment Centre, GUC is able to standardize examination procedures. The board of experts was impressed by the IT standards. By using the barcode system for each single exam the central examination office is well organized. The students are informed about the examination dates via internet and have the possibility to track the results of their exams online. To reduce the student's workload, exams and tests will be performed also during the current semesters. Examination forms are homework/assignments, quizzes, term papers, projects, oral and practical exams and mid-term and final exams. The examinations are module-related as well as knowledge and competence oriented. This system is also favoured by the students instead of one large exam at the end of the course. Students seemed to be satisfied with the examination system. Particularly noteworthy is that tests and quizzes are anonymous by the barcode system, or are carried out directly on a PC, which allows a maximum of objectivity in the assessment. By this electronic system the students can

also reflect their progress in each course. Additionally the course instructor is also able to control the teaching outcome. To relieve the professor's work, a coordinator for the quizzes was appointed.

Even if this examination system is well-accepted by students and staff it has to be mentioned that it also puts a lot of additional work on the teaching staff. The examination system should therefore be evaluated and the advantages and disadvantages should be discussed and where appropriate adjusted, especially in the higher semesters. The teaching staff should have more flexibility in the number and form of exams they offer within the modules.

Bad marks can be compensated by the students through another exam within the same module. This seems to be suitable for the students.

Maximum study duration should not exceed 65 % of the regular study duration e.g. for the Bachelor programs 13 semester (8+5 semester). Full time students must take not less than 60 % of the regular study load per semester (30 ECTS-points). If a student has therefore less than 18 ECTS points he or she will be not considered as a full-time student and will not be registered with the Ministry of Higher Education.

Students showing a low grade point average (less than 3.7) are placed on probation and these students have to consult the university adviser. Measures to improve the student's performance could be e.g. reduced academic work load per semester or offering extra courses.

### Transparency and Documentation

Aims, methods, and modalities are well-documented. However, entering the GUC homepage only little information concerning the structure of modules is available. Also, course materials are either not linked or not provided though one can easily find all staff research activities back to 1988.

The faculty has meanwhile developed a new homepage, a link of the new faculty homepage to the GUC website is still missing. This new homepage provides better information about the single modules and the class schedules to the students. Therefore, the peer group recommends the integration of the new homepage into the GUC website.

The examination regulations are written in a clear style and for each student a transcript of records will be issued after graduation. Diploma supplements, however, are not issued yet. So the diploma supplements have to be handed in for the two study programs. The diploma supplement example of the German Rectors' Conference (HRK) could be used as a template, the Egyptian educational system should be described in the diploma supplement. Also in the module description the workload of the students has to be described in contact hours and self study time.

### Student Support

The members of the expert group had the opportunity to meet representatives of the students from the different study programs. The experts gained the overall impression that the students receive the necessary support from the study programs which they need in order to accomplish their personal and academic aims while studying at GUC.

Student services include:

- Student counselling service (e.g. counselling regarding admission procedures, choice of study programs, orientation for new students, information about the different study programs and contents of studies);
- Students Career and Alumni Development Office (SCAD): career planning, support in finding an internship/field-work training, building contacts to labour market, soft-skills training, establishing the Alumni Network/Platform, carrying out the Alumni surveys. The SCAD office regularly organises internship and employment fairs on its own campus where companies, faculty, and students meet and exchange ideas in order to create a win-win situation for all.
- International student services for international students;
- Medical service for all GUC members;
- Transportation services: The GUC offers transportation service for all its students;
- Accommodation facilities;
- Sports facilities: The GUC sports facilities can be used during the day and at the weekends. This includes e.g. tennis, volleyball, basketball, handball.
- Extracurricular activities: A very valuable part of the education at the GUC are the extracurricular activities of the students. Students should not only acquire subject-related knowledge, they should also gain new skills, broaden their knowledge, work with colleagues, be an active member of the GUC community and be able to take responsibility for the society. Examples for the active working groups are Big Buddy Society (helps new students to get acquainted to the university life), Zusammen (organizes charity work), and Echo (the campus magazine).

The students evaluated the work load being feasible; they are also satisfied with the quality of the lectures and the examination system. In case of problems students are supported, corrections have been made to the study programs after criticism of the students. Students criticised that there is no feedback to the evaluation results, so it is recommended to implement feedback mechanisms. Students also mentioned strongly the focus on pharmaceutical biotechnology in the study programs, they wish to have more classical biotechnological aspects in the courses. Also own

laboratories equipped for specific biotechnology experiments and research is a wish of the students.

Compared to the last evaluation process, students of the GUC founded a student parliament, containing students of each faculty. In contrast to German universities the influence of the student parliament is low, but continuously developing. The involvement of the student parliament in the decision processes of the GUC should be intensified.

GUC provides a program for scholarships offered to talented students joining the GUC in the first and the subsequent academic years on condition that scholarship holders will maintain high level grades throughout their study at GUC. A number of full as well as partial scholarships are offered every year for the best graduates of Al-Thanaweya Al-Amma and equivalent, where students may be completely exempted from study fees during the whole study at GUC. GUC offers scholarships also for outstanding performance top ranked enrolled students from each study module and a scholarship program to distinguished sport achievements at international levels.

GUC also provides a financial aid program for students with financial difficulties, students who have brothers/sisters at GUC and students with national/international sports or cultural achievements.

#### Gender and Disability Compensation

Students with special needs are provided with additional service and facilities. The GUC campus is barrier-free and special examination arrangements are made in individual cases. A disadvantage compensation is not fixed yet in the examination regulations, but in case of illness/special needs individual solutions are found.

No discrimination of a sex was detected at the GUC. The gender ratio shows a male:female ratio of 1:1 in the study programs.

#### **4. Quality Management**

The GUC has defined key performances indicators (KPIs) to monitor and ensure the quality of its study programs. The KPIs are regularly evaluated. These indicators include the graduation, the non-completion and the placement rates, the mean student-to-faculty ratio, the average time of studying and the average high school score of admitted students. By analysing these indicators continuously, the overall performances of the study programs are controlled. Furthermore, the main data of the study programs are recorded such that the study plan can be systematically modified, if necessary. Within the GUC the Quality Management and Accreditation Committee (QMAC) supports the faculties in their quality management measures.

A sophisticated IT-System and a clearly defined and structured student selection ensures the quality of the students, which is also represented in the overall average high school score of 96%, which is even above the self-defined key performance of 90 %. All applicants for a GUC undergraduate program have to pass a reasoning and an English test, to ensure the quality of the candidates. There is also a clearly defined selection procedure for new staff members to guarantee the quality of the teaching staff. During the selection process also students are sometimes involved through the evaluation of the trial lecture.

Course contents are developed in a close cooperation with the patron universities of Stuttgart and Ulm. The start of the programs was supported by a German founding dean. The founding dean is still visiting the GUC in frequent periods and involved in the further development of the programs. The staff members are supported by the QMAC in the description of the modules.

There are two effective mechanisms to improve the study program continuously: Student course evaluations (online/also possible paper-based) and academic-staff evaluation and monitoring.

Students evaluate anonymous each course and the staff, before receiving their exam results, which guarantees for a 100% feedback. Since the courses of the first four semesters are studied by both PBT and BT students the specific feedback of the small group of BT students is taken in curriculum committee meetings. In urgent cases extra meetings between the students and the staff members take place. The BT students meet in the "Biotec Club" to discuss various issues concerning their courses. Students are in general satisfied with the quality management mechanisms and describe the study program as continuously improving. But students mentioned also, that their criticism is not always considered (due to the small size of the BT students group) and that there is not always a feedback about the evaluation results. It is recommended to give the students a feedback about the evaluation results.

The analyses and results of student evaluations are forwarded by the QMAC to the dean and the faculty, which will discuss the results and define if necessary a package of measures with defined activities, set targets, name persons responsible and set a timeframe to improve the respective study program. Curriculum changes are discussed in the curriculum committee. In the last years the program was developed further, so e.g. new methods were added to the course program like PCR or fermentation techniques, courses were removed, credits adjusted. It has to be mentioned that fundamental changes in the content and the structure of the programs can only be made involving the Egyptian Ministry of Education, which is a very lengthy process.

Beside the course evaluation there is also a staff evaluation. It is based on several indicators like the number of students passing the examinations, the student drop-out rate, the number of students per academic supervisor, the volume of funded research, the end-of-semester feedback report from students, participation in university committees. These indicators comprise a wide range of teaching

aspects and hence guarantee a balanced evaluation of each individual member of the teaching staff.

The peers are well aware of the danger associated with the evaluation of staff members based on the percentage of passing students in the exams. Any teacher can be tempted to lower the standards in order to increase the number of students passing. Quality management must be aware of that danger and must offer countermeasures.

The Student Career and Alumni Development (SCAD) office is carrying out the alumni surveys to monitor the career achievement of the alumni in the first years after graduation. The results are forwarded to the faculty for the further development of the programs. Concerning the placement of the graduates in the job market, it could be advantageous for the further development of the study program to define also a KPI for this item.

The SCAD office also supports students in finding an internship, offers soft skill trainings and organizes the employment fair. The employment fair is an important event, here the students have the possibility to get in contact with possible employers. Due to the fact, that the biotechnology industry in Egypt is still developing and the Biotechnology program and the competences of the graduates are not as known as in the Pharmacy program, it could be of benefit, to get in closer contact with firms of the biotechnology sector and include them into the program e.g. through excursions, practical labs. This would provide possible employers with more information about the program and increase the employment chances of the BT graduates in Egypt.

In summary the peers found a very well elaborated quality-management system at the GUC. The implemented measures are appropriate to ensure and improve the quality of teaching and learning as well as to optimise study conditions and infrastructure.

## **5. Conclusion**

The Bachelor and Master programs Biotechnology are positively evaluated. The objectives are reasonable and the programs are well organised. They offer the students a good education in the area of biotechnology. Currently the programs are focused more in the direction of red and pharmaceutical biotechnology to enhance the employment possibilities of the graduates in Egypt. Nevertheless the peers recommend to focus the programs more towards classical biotechnology aspects. Also own lecture rooms, laboratories and equipment should be provided. This would increase the attractiveness of the programs and the identification of the students with the study programs. Some formal aspects which are mentioned in the report (e.g. Diploma Supplement, revision of module descriptions, missing 1.5 ECTS-points for the Master program, awarding of ECTS-points for the internship in the Bachelor program) still have to be corrected.

The peer group would like to thank the GUC for the open and lively discussions and for the hospitality.

**6. Assessment of the “Criteria of the Accreditation of Study Programs” (resolution of the Accreditation Council of December 8th, 2008, last amended on December 10<sup>th</sup>, 2010)**

**Criterion 2.1 Qualification Objectives of the Study Programme Concept**

Criterion fulfilled

**Criterion 2.2 Conceptual Integration of the Study Programme in the System of Studies**

Criterion fulfilled

**Criterion 2.3 Study Programme Concept**

Criterion partly fulfilled

**Conditions:**

- For the compulsory internship in the Bachelor program ECTS-points have to be awarded.
- The Master program must have 90 ECTS-points, the GUC has to increase the no. of ECTS-points by 1.5 points.

**Criterion 2.4 Academic Feasibility**

Criterion fulfilled

**Criterion 2.5 Examination System**

Criterion fulfilled

**Criterion 2.6 Programme-related Co-operations**

Criterion fulfilled

**Criterion 2.7 Facilities**

Criterion fulfilled

**Criterion 2.8 Transparency and Documentation**

Criterion fulfilled

**2.9 Quality Assurance and Further Development**

Criterion partly fulfilled

**Conditions:**

- The Diploma Supplements have to be handed in for the Bachelor and Master study program. The Diploma Supplement example of the HRK could be used as a template, the Egyptian educational system should be described in the diploma supplement.
- The module descriptions have to be revised. The workload of the students has to be described in contact hours and self study time (see also the revised module descriptions of the study program "Pharmacy")

**Criterion 2.10 Study Programmes with a Special Profile Demand**

n.a.

**Criterion 2.11 Gender Justice and Equal Opportunities**

Criterion fulfilled

## **7. Accreditation Recommendation of the Peer Group**

The peer group recommends the reaccreditation of the Bachelor and Master program "Biotechnology" (B.Sc./M.Sc.) at the German University in Cairo with the following conditions and recommendations:

### **Conditions:**

- 1. The Diploma Supplements have to be handed in for the Bachelor and Master study program. The Diploma Supplement example of the HRK could be used as a template, the Egyptian educational system should be described in the diploma supplement.**
- 2. For the compulsory internship in the Bachelor program ECTS-points have to be awarded.**
- 3. The module descriptions have to be revised. The workload of the students has to be described in contact hours and self study time (see also the revised module descriptions of the study program "Pharmacy")**
- 4. The Master program must have 90 ECTS-points, the GUC has to increase the no. of ECTS-points by 1.5 points.**

#### IV. Decisions of the Accreditation Commission of ACQUIN

##### 1 Accreditation Decision

Based on the peer report, the statement of the university and the statement of the standing expert committee the accreditation commission took on September 27th, 2012 the following decisions:

##### **Biotechnology (B.Sc.)**

**The Bachelor program "Biotechnology" (B.Sc.) at the German University in Cairo is accredited with the following condition:**

- **The awarded ECTS-points for the internship in the Bachelor study program have to be integrated in the regular workload of the curriculum such that the total number of ECTS-points for the Bachelor program "Biotechnology" does not exceed 240 ECTS-points.**

**The accreditation is of limited duration and valid until March 31st, 2014.**

**After fulfilment of the condition the study program is accredited until September 30th, 2018. The German University in Cairo has to submit the documents for the fulfilment of the condition until July 1st, 2013. In case of insufficient proof of fulfilment of the condition the accreditation will not be extended.**

**After receiving a comment of the Higher Education Institution, the accreditation procedure can be suspended once for a period of not more than 18 month, if it can be expected that the Higher Education Institution will remedy the defects within this period.**

The decision of the accreditation commission differs in the following point from the accreditation recommendation of the peers:

##### Deletion of conditions

- *The Diploma Supplements have to be handed in for the Bachelor and Master study program. The Diploma Supplement example of the HRK could be used as a template, the Egyptian educational system should be described in the diploma supplement.*
- *The module descriptions have to be revised. The workload of the students has to be described in contact hours and self-study time (see also the revised module descriptions of the study program "Pharmacy")*

The conditions were deleted by the standard expert committee.

Reason:

The GUC has submitted a Diploma Supplement as well as revised module descriptions for the Bachelor program.

Rephrasing of condition:

- *For the compulsory internship in the Bachelor program ECTS-points have to be awarded.*

The condition was rephrased by the standard expert committee.

Reason:

For the compulsory internship 10 ECTS-points are now awarded, but the total number of the ECTS-points of the Bachelor program exceeds now the maximum number of 240 ECTS-points for a 4-year Bachelor program.

**Biotechnology (M.Sc.)**

**The Master program “Biotechnology” (M.Sc.) at the German University in Cairo is accredited with the following condition:**

- **The module descriptions of the Master program have to be revised. The workload of the students has to be described clearly.**

**The accreditation is of limited duration and valid until March 31st, 2014.**

**After fulfilment of the condition the study program is accredited until September 30th, 2019. The German University in Cairo has to submit the documents for the fulfilment of the condition until July 1st, 2013. In case of insufficient proof of fulfilment of the condition the accreditation will not be extended.**

**After receiving a comment of the Higher Education Institution, the accreditation procedure can be suspended once for a period of not more than 18 month, if it can be expected that the Higher Education Institution will remedy the defects within this period.**

The decision of the accreditation commission differs in the following point from the accreditation recommendation of the peers:

Deletion of conditions

- *The Diploma Supplements have to be handed in for the Bachelor and Master study program. The Diploma Supplement example of the HRK could be used as a template, the Egyptian educational system should be described in the diploma supplement.*

- *The Master program must have 90 ECTS-points, the GUC has to increase the no. of ECTS-points by 1.5 points*

The conditions were deleted by the standard expert committee.

Reason:

The GUC has submitted a Diploma Supplement for the Master program and revised the Master program. The number of ECTS-points was increased, so that the Master program has now 90 ECTS-points.

Rephrasing of condition:

- *The module descriptions have to be revised. The workload of the students has to be described in contact hours and self study time (see also the revised module descriptions of the study program "Pharmacy").*

The condition was rephrased by the standard expert committee.

Reason:

It is within the responsibility and autonomy of the GUC, how the workload of the students is described in the module descriptions.

**For the further development of both study programs the following recommendations are given:**

- In the curriculum classical biotechnology aspects should be integrated to a larger degree (enhancement for e.g. 30 %), e.g. pharmaceutical biotechnology aspects could be shifted to the elective modules.
- Research should be further encouraged and supported, so that it can influence the study programs to a greater extent.
- Students should get a feedback about evaluation results.
- In the module descriptions the reference lists should be updated. This literature should also be also available in the library.
- The contacts to the biotechnology industry should be enhanced esp. for the internship placements of the students. This could be done through cooperation contracts e.g. with European associations like the DECHEMA or Egyptian industry.
- The website of the Faculty PBT (with e.g. information about the modules and the class schedules) should be linked to the GUC website.

## **2. Fulfilment of conditions**

The German University in Cairo has submitted the documents for the proof of fulfillment of conditions in time. The documents have been forwarded to the standing expert committee „Mathematics/Natural Sciences“ for a statement. The standing expert committee assessed the conditions as fulfilled.

Based on the statement of the standing expert committee the accreditation commission took on September 24th, 2013 the following decisions

**The conditions of the Bachelor and Master program “Biotechnology (B.Sc./M.Sc.) at the German University in Cairo are fulfilled. The programs are accredited until September 30th, 2018.**