Ministry of Higher Education
& Scientific Research
Al-Nahrain University
College of Engineering
Biomedical Engineering Department

Education Quality Improvement Plan For Biomedical Engineering Program

A Continuous Improvement Progress Report Based on Self – Assessment Report of the Academic Year 2021−2022

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Chapter 1: Strategic Outlines

1.1 Department Vision:

The Department of BioMedical Engineering Endeavour's to be one of the leading Bio-medical engineering Programs in Iraq and the region.

1.2 Department Mission :

The Department's philosophy is to promote an educational model that Supports both professional and educational aspects of academic creativity and cultural development which operates within an encouraging environment technology exchange that employ and nourish students' skills and abilities for their own benefits and community's development. The Department offers a comprehensive program for undergraduate and postgraduate students as well as researchers that plays a pivotal role in the development of the medical and engineering areas in Iraq.
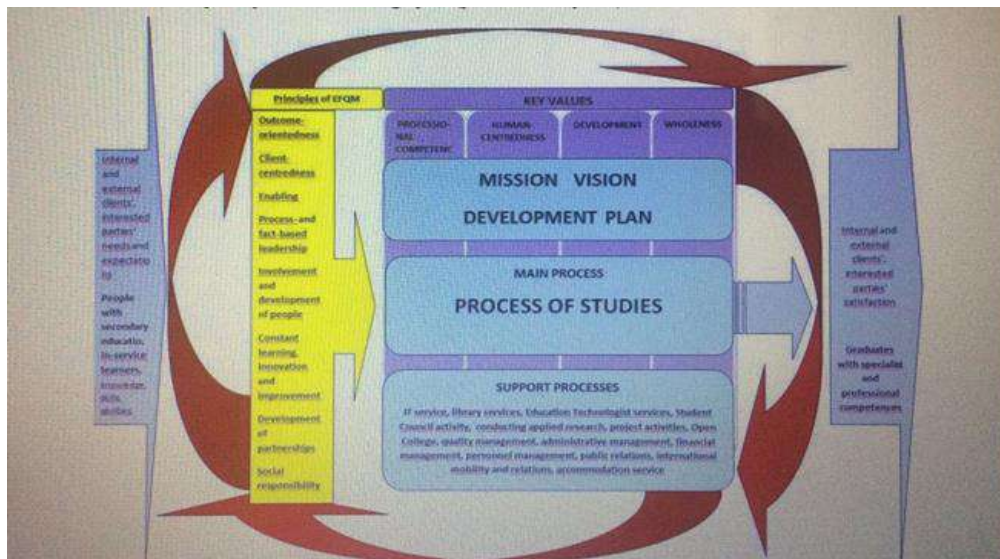
1.3 Department Executive Objectives :

Since its establishment, the Bio-Medical engineering department Al-Nahrain University, worked hard and continuously based on its noble mission to service society in order to achieve a number of strategic goals and objectives, the most important of them are:

1. Develop the scientific and experience levels of the faculty staff through exchange programs, training courses, enhancing educational practices and experiences.

2. Provide students with further educational experiences, training, research and activities in cooperation with institutions inside and outside Iraq.
3. Enhance the labs, devices and materials in cooperation with Iraqi ministries.
4. Develop the skills and capabilities of the assistant teaching and management staff to the benefit of the students and the dept.

The Bio-Medical Engineering department are aligned well, closely linked to, and consistent with the department's mission. The first one of the objectives provides the first step towards a career of achievement and service. The needed background of knowledge and skills are acquired to achieve this objective. Students acquire quality education through several avenues, including knowledge, skills and values as reflected. The professional and ethical issues are also preserved in. The qualities for self-development and professional growth and improvement of the faculty and administrative and technical staff.

The Bio-Medical Engineering department are closely linked to, and consistent with, the University of Al- Nahrain and College of Engineering missions.

1.4   Stakeholders Feedback:

1.4.1 Senior Faculty

The medical eng. Department senior faculty are established teaching faculty in both engineering and medial fields. It is one of the most versatile departments of the university regarding their various specialties and expertise. In order to elevate and exploit the abilities of the faculty to the fullest, the following work plan was generated:

1. Develop faculty members through training courses, workshops, fellowships, and research conduct inside and outside Iraq according their specialties.
2. Conduct a scientific exchange program for the specialized faculty members with national and international universities to develop educational methods and means as well as monitor up-to-date scientific and research accomplishments which shall benefit the developing process of the scientific and practical level for the faculty which in turn shall elevate the scientific level and effectiveness of students, alumni, postgraduates, and community.
3. Collaboration with the Ministry of Health and the Ministry of Higher Education and Scientific Research to supply the department's labs with modern devices and material in addition to specialized scientific training staff from the two mentioned ministries for scientific and practical exchange, teaching, and research purposes.
4. Conferences with national and international universities, industrial institutions to exchange information, identify obstacles, evaluate performances and find solutions.

1.4.2 Other Faculty and Staff

The Bio-Medical Engineering assistant faculty and staff are an essential part of the department who facilitate the process of education as well as management of the department. In order to develop and benefit further of this scientific and working force, we need to encourage them to pursue higher education in the fields most compatible with their specialty as well as the specific specialties needed in the department and involve them in training courses and workshops inside and outside Iraq to enhance their scientific and practical levels as well as the department's. Awards and recognition shall be given to distinguished staff for their accomplishments.

1.4.3 Students

Since future is in the hands of our students, we aspire to provide them with the best opportunities to help them achieve their goals. The steps to take are:

1. Conduct a plan for students' practice and implementation of acquired knowledge in cooperation with governmental institutions and under the supervision of the faculty through collaborative research and training programs at research centers inside and outside Iraq which can be performed through video conferencing and internet.
2. Organize practical field trips for students under the supervision of the faculty to hospitals, factories, and research centers to develop the students' skill and capabilities as well as encourage their creativity, innovation, and competitive spirit.
3. Optimize the curricular and teaching materials in cooperation with the experts from esteemed international universities according to the increasing demands of community under the supervision of the Iraqi MOHESR.
4. Encourage the students to engage in extracurricular activities to enhance their skills and stamina such as sports, intellectual games, competitions, and so on.

1.4.4 Alumni and Industry

The department keeps in touch with its alumni in order to identify the obstacles as well as the merits of their careers as graduates of this dept. the following points are to be taken into consideration for the development of the work plan:

1. Although our alumni were on top of their career, but the constant change and upgrade of work demands must be taken into consideration to help the students cope with the everlasting change. The dept. hold annual meetings and seminars to identify the obstacles they face and come up with future plans to overcome them as well as enhance the useful part of their knowledge.
2. Distribute questioners to alumni inside and outside Iraq online to give them the opportunity to state their opinion and give suggestions to develop the educational process further.

3. Detecting the needs of the industrial market by contacting medical, industrial, and business institutions to have feedback on their needs and benefit from their suggestions in steering scientific and practical education for our students.
4. Arrange for annual training and workshops for our students at these institutions to help the students experience fieldwork firsthand before emerging into the society as an alumni officially.
5. In the end, every effort spent on the development of the dept.as well as the quality of the alumni which it produces shall affect the quality of industry and eventually affect the community itself.

Chapter 2: Needs Assessment

2.1 External Factors Opportunities &Threats of (SOWT) Analysis:

2.1.1 Political

Institutions must develop the evaluation process in a scientific and practical manner to cover all aspects in the government's sectors. This can be done by following the international evaluation standards and modifying them to the needs of each sector. A training on the new evaluation system for universities must be carried out and follow-up for the conducting and performance of the evaluation process by experts. Continuous feedback of the program must be reported on a regular basis and an annual meeting or conference for the universities representatives to discuss the aspects, problems and enhancement of the program.

2.1.2 Economic

Community economic development (CED) creates local economic opportunities and improves quality of life. CED recognizes that local challenges and opportunities are as varied as the individual communities themselves. By using knowledge and resources resident in the community, CED identifies and capitalizes on local opportunities to stimulate economic growth and employment. This can include developing entirely new businesses or industries, adding value to existing sectors, strengthening capacity, and improving local infrastructure to help communities achieve their full economic potential.

In our country, since security is an obstacle for international investment as well as the expansion of local business, opportunities are limited for graduates and the alumni in invest their full potential in their careers. Therefore, the university can help students establish small-scale projects under the supervision of their exports funded partially or fully by the Iraqi institutions or the government.

2.1.3 Social

Modern democracies need an educated citizenry to survive and to thrive. If a nation expects to be ignorant and free, Democratic societies are both enriched and challenged by a diverse citizenry. Democratic education encompasses the varied institutional structures and curricular contents that are suitable for educating free citizens of democratic societies. This entry considers key aspects of democratic education: the question of governance, challenges of multiculturalism, democratic higher education, and education in transitional democracies.

The university and the Biomed. Eng. Dept. encourage social activities such as students' debating on various subjects and seminars to widen their horizons beyond the norms.

2.1.4 Technical

Bio-Medical Engineering is characterized by the interdisciplinary co-operation of technology, science, and ways of thinking, probably more than any other technological area. The close interaction of engineering and information sciences with medicine and biology results in innovative products and methods, but also requires high standards for the interdisciplinary transfer of ideas into products for patients' benefits.

A collaboration between the ministry of higher education and the ministry of health must take place to have universities, medical institutions and research centers cooperate to conduct training programs for faculty, technical staff and students as well as reducing routine and paperwork that has been a dragging system for participants.

2.1.5 Environmental

Bio-Medical Engineering can be used to restore, maintain, or enhance the medical **e**nvironmental. The potential impact of this field, however, is far broader—in the future, M.E could reduce the need for organ replacement, and could greatly accelerate the development of new drugs that may cure patients, eliminating the need for organ transplants altogether. The Bio-medical Engineering that effects and is affected by the environment, but for this section significant impact on the development of medical devices and pharmaceutical industry and other, as well as promote and maintain the sustainability of human life and the fact that this section is related to the field of the important areas of life, healthy side.

2.2 Internal Factors (SWOT) Analysis:

2.2.1 Strengths:

The educational programs available in the department are considered relatively modern and diverse in both undergraduate and postgraduate study. Our well-equipped labs and the practical studies performed as well as their proximity to the study hall have earned our department an outstanding reputation among other universities. As for the faculty:

1. Sufficient number of the faculty members are available having a wide spectrum of specialties and comprising both young and dynamic members with members that possess rich experience in education. All the faculty works with loyalty and affiliation and they earn good salaries.

2. Curriculum is designed to meet both local needs and international standards. It covers major ME science components, includes a well structured laboratory practice, contains good professional components, and provides a variety of general education subjects. The curriculum maintain constancy throughout the years of study, so that there is no gap in the whole FIVE years.

3. Suitable number of computer, good equipped laboratories, acceptable library and IT Facilities are available.

4. Well defined responsibilities and authorities are assigned to all of the Department's committees.

5. There is a continuous desire for development, and strong motivation for service among all employees. All loyalty and affiliation.

6. There is good relationships in-between all employees, between employees and students, and between employees and work sectors.

7. Students admission is above a certain minimum qualification, and according to their rating average and desire.

8. A balanced portions of gender among students and sufficient number of Faculty advisors from both genders.

Dynamic Quality Assessment Cycle
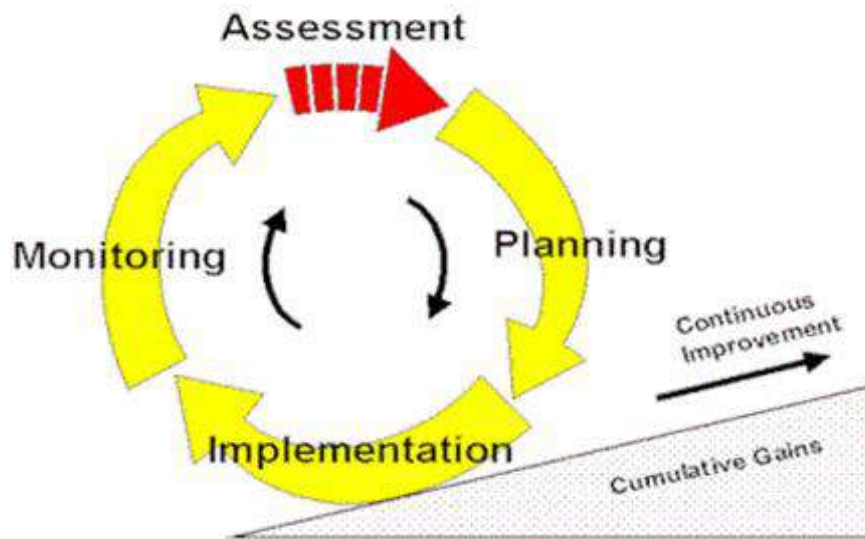
2.2.2 Weaknesses

1. Weakness of faculty rehabilitation programs.

2. Incomplete infrastructure of students' training labs.

3. Limitation of excellence of scientific research locally and regionally.

4. Limitation of extension and expansion of campus in a way that allows future expansion of the dept.

5. Feeble relationship with both public and private sectors as well as with international research centers and academic institutions.

6. The dominance of teaching over learning.
7. Lack of computer aided ME applications
8. Lack of team work practices
9. There is a lack of sum specialties in the faculty and a lack of high ranks due retirement of senior faculty members because of age limit.
10. Relations with international research and academic institutions are poor.
11. New faculty members have limited teaching experience, limited industrial and limited research experience, while the new faculty development program is inadequate.
12. The number of engineers, technicians, and other supporting staff is insufficient.
13. Deficiencies in certain outcomes in graduating students especially in the areas of sustainability, environment, ethics, safety, management, contracts, quality,

communication, real world design applications, some contemporary technical and economical issues and the impact of engineering solutions in a global and societal context.

14. There is a lack of motivation to excel among students having inadequate desire to critical thinking and language betterment, and suffering from the culture of being "spoon-fed".
15. Relations with alumni are very poor.
16. There is a need for more laboratories buildings and equipment.
17. Funding of research is very limited.
18. Improvement of teaching facilities.
19. Employing more human resources.
20. Maintaining and upgrading laboratories and adding new buildings is insufficient.
21. The poor internet services at the university.
22. The complicated and restrictive purchasing procedures.

Chapter 3: Action plan

3.1 Students

Objective	Assessment	Priority	Action	Involvement	Outcome	Measure	Timelines	Progress
Set standards and policies for the BME undergraduate program and develop the functioning of the undergraduate and postgraduate program.	Feedback of the faculty, students and alumni regarding the curriculum, teaching methods, and chances to improve the overall program.	H	Hold seminars and questioners, acquire Up-to-date curriculums, and hold training for main and assistant staff as well as students, workshop, conduct linkage programs for students' training at governmental facilities. Hold constructive activities for the students.	The Dept., the college, The University, and prospected partner facilities.	Increasing the academic quality of the student body.	managing ABET issues, including regular review of course syllabus, course objectives, and Course content, in conjunction with Curriculum Subcommittee&Monitoring the progress of individual students, providing mentoring services and advice for undergraduate research and job placement.	5 years program	In progress

Objective	Assessment	Priority	Action	Involvement	Outcome	Measure	Timelines	Progress
Raise the level of responsibility and awareness for students and increase the level of attendance as well as encourage students' activities	Follow-up student attendance, engaging lectures, increase the practical applications, active classrooms, field visits and training, appoint marks for attendance	H	Follow-up student attendance, engaging lectures, increase the practical applications, active class rooms, field visits and training, appoint marks for attendance	Department	To minimize the absence of students and to help them engage in their lessons and increase their academic achievement.	Keep a periodic record of student's attendance, alert the students who are about exceeded the limit and suspend them if the limit is exceeded.	Performed periodically per course	Have been implemented
Encourage the student to choose the applied research that generate experience and knowledge of local and international markets	Develop an understanding of professional and ethical responsibility.	H	Enhance the ability to design a system, component, or process to meet desired needs.	Allfaculty	Enhance ability to design, conduct experiments and to analyze and process data.	Under &post graduate research reflect the ability to identify, formulates, and solves medical engineering problems.	An ability to communicate effectively.	Have been implemented

Objective	Assessment	Priority	Action	Involvement	Outcome	Measure	Timelines	Progress
Educate and encourage the students how to assess the teaching process	Make a Questionnaire which reflects the absolute goals for which they were intended understanding of the field of the questionnaire and the level of importance of raising the scientific level of the output section	M	Hold meetings with the targeted students to help them assess the teaching program effectively and logically. Work as a team with students to find alternatives to reach better solutions.	Department	Increase the effectiveness of students' roles and involve them in improving the teaching program	REPEAT& Modify the Questionnaire for each course to help improve the work plan for each academic year	1 term	Have been implemented

3.2 Program Educational Objectives

Objective	Assessment	Priority	Action	Involvement	Outcome	Measure	Timelines	Progress
Develop the ability to communicate effectively with global & social contexts in order to find out the demands of the current work markets.	enhance the ability to use &apply the techniques, skills, and modern medical &engineering tools necessary for medical engineering practicing field (hospitals and industries)	H	A broad education necessary to understand the impact of engineering solutions in global and societal contexts. Hold job fairs with prospected share holders at our university.	Dept., College, university, & Businesses	An ability to apply knowledge of mathematics, science, and engineering An ability to design a system, component, or process to meet desired needs An ability to function on multi-disciplinary teams	Hold annual meeting and conduct questioner with industrial facilities and students online or directly to identify their needs and problems	Annual system	Follow up

3.3 Program Outcomes

Objective	Assessment	Priority	Action	Involvement	Outcome	Measure	Timelines	Progress
Increase the ability to communicate effectively and apply theoretical and practical knowledge in accordance to the market demands to solve medical engineering problems	An implementation plan to improve quality and take feedback from alumni and businesses	M	Make a reformation plan for the department taking into consideration the results of the questioner	All the committees formed in accordance with the decisions of the Dean	Improve the level of performance in the dept., teaching, and administrations to meet the international accreditation standards and the mission of the dept.	Make a questioner to alumni, businesses, staff, and faculty regarding the results of the plan.	Annual	Follow up

3.4 Quality Assurance

Objective	Assessment	Priority	Action	Involvement	Outcome	Measure	Timelines	Progress
Rehabilitation of buildings, preparing room, faculty, scientific curriculum adopted from the vision and mission of this program

prepare equipment, devices, furniture following international standards | The faculty continuously improves the performance of the Department by improving any weak process or deficit in achieving the outcomes

Form a scientific committee to improve and update curriculum periodically

Form a committee responsible for ensuring quality supervised by the dean's office and university presidency

Hold workshops | H | Review and improvement of curriculum.

Development of faculty through training programs.

Promotion of some faculty members to higher ranks.

Purchasing additional laboratory equipment and instruments.

Purchasing additional books for the library.

Purchasing additional computers.

Employment of new faculty, administrative and technical staff.

Conducting scientific conferences, symposiums and workshops.

Rehabilitation of buildings, services, infrastructure and venues.
Hold workshops and conduct questioners to improve quality. | Dept Head

Dept. faculty & staff

Dean Office

Quality Assurance Committee | Improve the work of the dept. to be according to the international quality standards

Solve problems and increase the awareness of the faculty and staff | Exams results

Questioners results

By using employers survey, students survey, alumni survey, faculty discussions and industrial conciliations | Annual | Follow up |

3.5 Curriculum:

Objective	Assessment	Priority	Action	Involvement	Outcome	Measurement	Timelines	Progress
Adoption of curriculum standards based on the vision and mission of the dept. practically and theoretically as well asdevelopment of a certified system by updating curriculum to keep up with the international scientific development	Form a committee to improve the curriculum , teaching methods and process	H	coordinate requests for new courses, course changes, withdrawal of courses

recommendations for additions/deletions from the undergraduate & postgraduate program

review course concurrence requests from other departments

manage ABET issues

Hold meetings, Workshops

The committee provide reports to the dept management to enhance curriculum and teaching methods

Test follow-up

Use various ways of testing and different models of questions for exams to enhance students intellectual and scientific capabilities | Curriculum Improvement committee

Faculty

Dept . management | create and maintain a coordinated and cohesive array of courses in support of the undergraduate curriculum and to establish and maintain the interdepartmental cooperation necessary to facilitate the interdisciplinary education of our students and avoid redundancy in faculty teaching responsibilities

To raise the level of courses and curricula

Have students and alumni become competent to keep up with international development | Conduct tests and use students scores to measure the effectiveness of the new curriculum

And how to choose the necessary researches which help solve problems and difficulties in society | annual | Follow up |

3.6 Faculty

Objective	Assessment	Priority	Action	Involvement	Outcome	Measure	Timelines	Progress
Improving the academic abilities of the faculty and high skills of the staff. The dean office and university presidency Support the dept. Faculty in management and provide them with a wider range of authorization in dealing with the problems the dept. May face to strengthen the bond between the dept. Faculty and students. Provide the staff with up-to-date communication devices to connect internationally and locally through better internet service and other communication services.	The dean office conduct workshops and meetings with the faculty and staff and provide reports regarding the scientific process in the dept.	H.	Send staff out of the country to follow the scientific development Hold educational seminarsand workshops for staff Internet connection enhancement to connect with international and local facilities	Dean Department heads	Efficient developmentof teaching Preparation of an efficient scientific staff who lead the scientific process in a magnificent scientific and administrating way to ensure the graduation of capable alumni and students whom are able to solve problems of society efficiently	There are some complications due to the financial crisis Reports by the faculty and results students questioners	Annual	Follow up

3.7 Facilities

Objective	Assessment	Priority	Action	Involvement	Outcome	Measure	Timelines	Progress
Building installations in terms of good furniture, devices and equipment. Clean environment, water supply, and supervised cleaning staff Providing shades and plant shading trees over exposed areas all over the university Provide transportation inside the university	Committees from the ministry to follow-up and report the maintenance and requirements of the facilities Provide more cleaning personnel with adequate equipments	H	Continued monitoring of lab space, equipment, computer labs and classrooms to ensure student productivity and safety by the dept. provide reports regarding progress to the dept. head and quality insurance committee	Head of Department Dean office	Comfortable environment to the faculty and students for teaching, learning and application of scientific research Preserve building regarding the architectural and healthy sides making them adequate for the educational process	Reports and follow-up by the dept. and dean office	Annual (depends on budget availability)	Follow up

3.8 SUPPORT

Objective	Assessment	Priority	Action	Involvement	Outcome	Measure	Timelines	Progress
Graduate medical engineers who meet the requirements of industry, construction and other sectors of the medical engineering work market. Financial and moral support by the government such as the central employment system, hold local & international conferences, scholarships and fellowships Provide administrational facilitations to reduce routine paperwork regarding cooperation between scientific institutions	Hold partnership projects between governmental and industrial entities to support small, individual, and group businesses for students and alumni Hold conferences, provide grants, and central employment Form joint committees between the higher education institutions and other ministries to display problems and solve them using academic research	H	Participate in local and international conferences Small grants for alumni business and researches Fellowships hold meeting with different colleges and ministries to understand work and social problems to try to reach scientific solution performing applicable research which are useful to the society	Faculty College Ministry Government	Students trust the dept., faculty, college, and government by qualifying and support themto have successful careers	Final examination results of students in graduate level projects identify quality alumni in their fields	Annual (depends on the availability of budgets)	Follow up

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