Ministry of Higher Education & Scientific Research

Al-Nahrain University– College of Engineering

Department of Biomedical Engineering

Self-Assessment Report
For B.Sc. in Biomedical Engineering Program

Prof. Dr. Ayad M. Tekl
Dean of College

E-mail: basma.a.faihan@nahrainuniv.edu.iq

Website: http://www.nahrainuniv.edu.iq

E-mail: eman.g.khalil@nahrainuniv.edu.iq

Website: http://www.nahrainuniv.edu.iq

2025

1446

CONFIDENTIAL

TABLE OF CONTENTS

BACKGROUND INFORMATION

1. Contact Information

Prepared by:

Basma Abdulsahib Faihan Faculty Member Department of Biomedical Engineering College of Engineering/ Al-Nahrain University basma.a.faihan@nahrainuniv.edu.iq	Eman Ghadhban Khalil, Ph.D. Faculty Member Department of Biomedical Engineering College of Engineering/ Al-Nahrain University eman.g.khalil@nahrainuniv.edu.iq
Muna Mustafa Kareem, Ph.D. Faculty Member Department of Biomedical Engineering College of Engineering/Al-Nahrain University muna.kareem@nahrainuniv.edu.iq	Hussain Abd Jaber, Ph.D. Faculty Member Department of Biomedical Engineering College of Engineering/ Al-Nahrain University hussainjaber2000@nahrainuniv.edu.iq
Zaid Mustafa Khudair, MSc. Faculty Member Department of Biomedical Engineering College of Engineering/Al-Nahrain University zaid.mustafa.kh@nahrainuniv.edu.iq	Ahmed Lateef Khudarahm , MSc. Faculty Member Department of Biomedical Engineering College of Engineering/Al-Nahrain University ahmed.lateef771@nahrainuniv.edu.iq

2. Program History

The Department of medical Engineering at Al-Nahrain University was established in 1997 as one of the departments within the College of Engineering. In 2015, the department underwent a significant transformation, adopting its current name to better reflect its focus on the interdisciplinary field of biomedical engineering. Since then, the department has made remarkable strides, including the introduction of a Ph.D. program in Biomedical Engineering in 2017.

The candidates should have a secondary school certificate in scientific section. The B.Sc. degree in BME is conferred after successfully completing 193 credit units in five years, each having two semesters (or levels) per year. The courses include compulsory and elective subjects. The graduates will be prepared to work in the health centers and hospitals, in both the governmental and private sectors. The graduate will also have the opportunity to be eligible to pursue postgraduate studies.

To date, about 402 students have graduated with a Bachelor's degree, 180 have earned a Master's degree in Biomedical Engineering Sciences, and 15 have achieved a Doctorate. This specialization remains one of the rarest in Iraqi universities. Our graduates are actively contributing to various sectors, serving as university lecturers in colleges and technical institutes, as well as biomedical engineers in hospitals, medical centers, companies, and research institutions. They play a vital role in advancing healthcare and enhancing societal well-being.

The demand for biomedical engineering expertise has become increasingly evident in both government and private hospitals, particularly for the monitoring and maintenance of medical devices. Notably, many graduates from previous years were appointed by the Ministry of Health in 2015 and 2018, reflecting the critical need for skilled professionals in this field.

Eight years ago, our department achieved the highest acceptance rates among the College of Engineering departments, and our top graduate has consistently ranked among the best in the college for the past four years. Furthermore, most graduate student research, along with several undergraduate projects, focuses on applied research conducted in collaboration with specialized doctors in hospitals, utilizing real samples to address practical challenges in the field.

3. Options

No options in the program

4. Program Delivery Modes

The B.Sc. degree in BME Program is offered by the Faculty of Engineering daytime (8 AM -3 PM) at Al-Nahrain University Campus on a full-time basis in lectures and laboratories. The university utilizes an on-line course management system (Google Classroom) to help organize teaching and learning resources and facilitate students' learning through providing supplementary material to classroom instruction.

The University utilizes the credit-hour system, whereby most theoretical courses are assigned three (3) credit hours, and laboratory courses are assigned one (1) credit hour. Students are required to successfully complete the total number of credit hours in the program to graduate. All students are required to spend *one month* in summer training (cooperative education) for the third and fourth years.

The academic year at Al-Nahrain University consists of two regular semesters and an optional summer semester (in accordance with the Bologna Process). It should be noted that while the BME department does not offer part-time study, evening study programs are available. The delivery of the B.Sc. degree in BME Program is summarized in Table 1.

Table 1: B.Sc. degree in BME Program

Study Mode	Delivery Timing	Delivery Location	Delivery Mode	Academic Year	Campus
Morning	8 am -3 pm	Classrooms and Teaching laboratories	Course- Based Following Credit Hours System	Two Semesters + Optional Summer Semester	Main Al-Nahrain University Campus
Evening	3 pm -8 pm				

5. Program Locations

The B.Sc. Program is offered on the main UN campus. All courses and laboratory sessions are conducted in BME Department buildings and Laboratories. There is no plan to offer the program in other campuses.

Public Disclosure

Al-Nahrain University is transparent in all its communication with the students, faculty, staff, external relations, and the public. This commitment is clearly reflected in university publications, practices, and contractual arrangements. The B.Sc. Program Education Objectives (PEOs) and graduation Outcomes (GOs) are published in print and electronically and accessible both externally and internally. Relevant program information is provided to the public through University publications like the University Catalogue, the Department's bulletin boards, and the College of Engineering website at:

https://www.eng.nahrainuniv.edu.iq/page.php?id=492

6. Previous Evaluations and the Actions Taken (if applicable)

This will be the first evaluation by an ICAEE evaluation team.

ACCREDITATION CRITERIA

CRITERION 1: PROGRAM EDUCATIONAL OBJECTIVES

1.1 Strategic Planning

Al-Nahrain University

Vision

The university is to be a tool for the prosperity of the community through excellence in the teaching methods, and in the research and innovation fields, creating the appropriate climate for intellectual competition and partnership, and the contribution in the preparation of future leaders in various fields in line with economic developments in Iraq and the labor market

Mission

To meet the needs of the community and the educational development by offering high quality programs, contributing in the development of knowledge in the community, taking a leading role in the field of creative researches, keeping up with the progress of knowledge and modern technology, and the quest for independence in scientific, administrative and financial levels.

Objectives

1. To achieve world-class quality of programs and educational services provided within the university.
2. Employing the scientific research to be in the service of national development issues.
3. Relying on advanced technology, especially the information technology.
4. Developing competitiveness in the field of education and research among the Iraqi and Arab universities.
5. Activating the participation in, local and international seminars and conferences and professional organizations by the twinning principle and by memoranda of understanding and bilateral agreements.

The vision, mission and goals statements are published on web site:

https://nahrainuniv.edu.iq/ar/node/25044

Engineering College

Vision

A pioneer in engineering sciences and their applications that effectively contributes to serve and develop local and global communities.

Mission

To provide the highest quality of engineering education and scientific research that will find solutions to the engineering problems and challenges by utilizing technology, innovation, and exchange of knowledge.

Goals

1. To prepare pioneer engineers in their workplace by providing them with the required learning and training courses.
2. To conduct novel scientific research, including graduate studies, that mainly contributes to finding solutions for different engineering problems.
3. To prepare engineers adhered to the professional ethics, standards, and applicable laws to avoid corruption and deviation.
4. To develop the abilities of the faculty and staff members to improve the quality of education and scientific research.
5. To provide engineering consultancy services that meet the essential requirements of community and institutions.

The College of Engineering vision, mission and goals statements are published on web site:

https://eng.nahrainuniv.edu.iq/page-en.php?id=445

Biomedical Engineering Department

The BME Engineering Department at the College of Engineering/ Nahrain University offers engineering programs leading to the degree of Bachelor of Science (B.Sc.).

Vision

In the coming years, the Biomedical Engineering Department aspires to become a pioneering and distinguished academic and research institution at the national and regional levels, capable of making a tangible and positive impact on higher education, healthcare services, and the biomedical industry. The department seeks to develop an integrated scientific environment that embraces creativity, innovation, and rigorous research, while fostering intellectual competitiveness and dynamic interaction among students, faculty, and researchers.

The department also aims to establish strategic partnerships with international universities, research centers, and biomedical companies to exchange expertise and develop cutting-edge technological solutions that address healthcare challenges and meet the evolving demands of the labor market. Preparing a new generation of graduates who are scientifically, professionally, and ethically qualified is one of the department's top priorities. These graduates will be capable of keeping pace with rapid advances in engineering, medical sciences, and modern technologies, while actively contributing to driving change and development in Iraq and the region.

Through this vision, the department positions itself as a leading academic pillar that effectively bridges theoretical knowledge with practical applications, ultimately serving humanity and advancing the well-being of society.

Mission

The Department of Biomedical Engineering at Al-Nahrain University is dedicated to preparing qualified engineers who integrate engineering principles with medical sciences to serve both the community and the healthcare sector. The department equips its students with solid theoretical knowledge and practical skills that enable them to design, develop, operate, and maintain advanced medical devices and systems, thereby improving disease diagnosis, treatment quality, and patient care.

In addition, the department is committed to applied research that addresses real medical challenges in collaboration with physicians and healthcare institutions. The primary beneficiaries of this mission are patients, healthcare professionals, and medical institutions, while also contributing to the advancement of scientific and technological development in Iraq.

Program objectives

1. Provide an exceptional academic experience through innovative teaching, a modern curriculum, and career-focused training programs in biomedical engineering.
2. Foster advanced research to develop solutions for complex challenges in medical technology, prosthetics, diagnostics, and healthcare systems.
3. Train professionals committed to ethical standards, legal regulations, and anti-corruption practices in healthcare technology and engineering.
4. Support continuous improvement in education and research quality for academic staff and department personnel.
5. Offer expert biomedical engineering consultancy to hospitals, healthcare institutions, and industry partners, ensuring solutions meet technical and clinical requirements.

The BME Department vision, mission and objectives statements are published on the web site:

https://www.eng.nahrainuniv.edu.iq/page.php?id=445

1.2 Implementation of the Strategic Plan Procedures for Biomedical Engineering Department

This section outlines the specific procedures undertaken by the Department of Biomedical Engineering as part of its comprehensive strategic plan. The information is derived from the department's detailed strategic plan schedule and is supported by administrative orders from the College of Engineering. Each procedure has designated personnel for implementation and for monitoring, ensuring a clear chain of accountability and effective execution.

The strategic plan of the Department of Biomedical Engineering is not limited to defining objectives and activities; it also incorporates a clear and well-documented mechanism for monitoring and evaluation that ensures effective implementation. This mechanism is based on the following elements:

- **Responsibilities precisely assigned:** As shown in the Table 1.1, both “implementation officers” and “monitoring and evaluation officers” are identified for each procedure and activity. This distribution guarantees that one party is directly responsible for execution while another is accountable for monitoring and evaluation.
- **Quantitative performance monitoring:** The department applies measurable indicators by comparing the “planned completion rate” with the “actual completion rate” for each activity. This approach provides an accurate picture of the progress achieved in meeting the strategic goals.
- **Formal monitoring committees established:**
    - *Department-level monitoring committee:* Formed internally to continuously and periodically follow up on the implementation of the strategic plan, as documented in the attached administrative order.
    - *College-level supporting committee:* Established by the College of Engineering to reinforce departmental efforts. In this committee, Dr. Hussain Abd Jaber from the department was appointed as a member to ensure coordination and integration.

The presence of these committees, along with clear responsibilities and measurable indicators, represents strong documented evidence of an organizational framework and institutionalized mechanism for monitoring and evaluating the effectiveness of the strategic plan implementation.

1. Academic Programs and Curriculum Development

To ensure the curriculum remains relevant, competitive, and aligned with industry needs, the following procedures were executed:

- **Procedure 1.1.1: Curriculum Review and Modernization**
    - **Action:** A comprehensive review and update of the B.Sc. in Biomedical Engineering curriculum was conducted to ensure alignment with counterpart programs at leading regional and international universities.
    - **Implementation:** The Department's Scientific Committee.
    - **Monitoring & Evaluation:** Prof. Dr. Auns Qusay Hashem.

- **Procedure 1.1.4: Stakeholder Engagement in Curriculum Design**
    - **Action:** Engaged stakeholders from government ministries and private sector companies by including them in curriculum review committees. This ensures graduates' skills meet evolving market demands.
    - **Implementation & Monitoring:** Prof. Dr. Auns Qusay Hashem.

2. Research and Postgraduate Studies

The department has taken steps to focus its research output on addressing real-world challenges and increasing its international visibility:

- **Procedure 2.1.1: Problem-Oriented Research**
    - **Action:** Directed postgraduate research projects to focus on solving tangible problems within the industrial, health, agricultural, and environmental sectors.
    - **Implementation:** The Department's Scientific Committee.
    - **Monitoring & Evaluation:** Prof. Dr. Auns Qusay Hashem.

- **Procedure 2.2.1: Encouraging High-Impact Publications**
    - **Action:** Implemented a support and incentive system to encourage faculty and students to publish their research in high-impact international journals indexed in Scopus and Clarivate.
    - **Implementation:** The Department's Scientific Committee.
    - **Monitoring & Evaluation:** Prof. Dr. Auns Qusay Hashem.

3. Student Development

To produce well-rounded graduates, the department is enhancing professional skills training:

- **Procedure 3.3.1: Entrepreneurship and Innovation Training**

- **Action:** Developed and integrated training modules focused on entrepreneurship and innovation to enhance student capabilities and prepare them for the modern biomedical industry.
- **Implementation:** Dr. Hussain Abed Jaber
- **Monitoring & Evaluation:** Prof. Dr. Auns Qusay Hashem

4. Community Engagement and International Collaboration

The department is actively expanding its network to enrich the academic environment:

- **Procedure 4.1.1: Scientific Cooperation Agreements**
  - **Action:** Established formal scientific cooperation and expertise-exchange agreements with reputable local, regional, and international universities.
  - **Implementation & Monitoring:** Prof. Dr. Auns Qusay Hashem

- **Procedure 4.2.1: Visiting Professor Program**
  - **Action:** Enriched the academic environment by hosting visiting professors from distinguished international universities to collaborate on teaching and research.
  - **Implementation:** The Department's Scientific Committee.
  - **Monitoring & Evaluation:** Prof. Dr. Auns Qusay Hashem.

5. Faculty and Staff Development

The department is committed to the continuous professional growth of its members:

- **Procedure 5.1.1: Emeritus Professor Program**
  - **Action:** Leveraged institutional knowledge by utilizing the expertise of retired professors in rare specializations through an emeritus professor program.
  - **Implementation:** The Department's Scientific Committee.
  - **Monitoring & Evaluation:** Prof. Dr. Auns Qusay Hashem.
- **Procedure 5.3.2: Needs-Based Training Programs**

- **Action:** Developed and implemented comprehensive training programs tailored to the specific needs of faculty and staff to enhance performance efficiency and professional skills.
- **Implementation:** Dr. Hussain Abed Jaber.
- **Monitoring & Evaluation:** Prof. Dr. Auns Qusay Hashem.

6. Infrastructure and Resource Enhancement

Significant focus was placed on improving the physical and technical resources available for teaching and research:

- **Procedure 6.1.1: Infrastructure Development**
  - **Action:** Initiated projects to develop the department's physical infrastructure, including the upgrading of classrooms, laboratories, and engineering workshops.
  - **Implementation:** Dr. Hussain Abd Jaber.
  - **Monitoring & Evaluation:** Prof. Dr. Auns Qusay Hashem.

- **Procedure 6.1.2: Establishment of New Laboratories**
  - **Action:** Began the process of establishing new, specialized scientific laboratories equipped with advanced technology to support cutting-edge teaching and research activities.
  - **Implementation:** Dr. Hussain Abd Jaber
  - **Monitoring & Evaluation:** Prof. Dr. Auns Qusay Hashem

7. Governance, Administration, and Quality Assurance

To ensure compliance with accreditation standards and improve efficiency, the following key procedures were actioned:

- **Procedure 7.1.1: Electronic Management System Implementation**
  - **Action:** Deployed a university-wide unified electronic management system for all departmental operations to enhance administrative efficiency.

- **Implementation:** Dr. Hussain Abed Jaber
- **Monitoring & Evaluation:** Prof. Dr. Auns Qusay Hashem

- **Procedure 7.2.1: Achieving Accreditation Requirements**
  - **Action:** Systematically worked to fulfill the requirements for national and international institutional and programmatic accreditation (e.g., ABET).
  - **Implementation & Monitoring:** Prof. Dr. Auns Qusay Hashem
  - **Evidence of Implementation:** As documented in the provided administrative orders, a supporting committee was officially formed by the College of Engineering to oversee the implementation of quality assurance measures related to accreditation. **Dr. Hussain Abd Jaber** from the Department of Biomedical Engineering was appointed as a key member and rapporteur of this committee, demonstrating the department's direct involvement in executing and monitoring these critical strategic goals at the college level.

This structured approach demonstrates the department's proactive and organized execution of its strategic plan.

Table 1.1 Strategic Plan Implementation Table

Procedure No.	Procedure Title	Execution Year	Implementation Officers	Monitoring & Evaluation Officers	Planned Completion Rate	Actual Completion Rate
1-1-1	Review and update current curricula and align them with corresponding departments in regional and international universities	2024-2025	Scientific Committee	Asst. Prof. Dr. Anas Qusay Hashim	1	1
1-1-4	Involve ministries and private sector institutions in college committees to develop the knowledge and skills graduates need to meet changing market requirements	2024-2025	Asst. Prof. Dr. Anas Qusay Hashim	Asst. Prof. Dr. Anas Qusay Hashim	1	1
1-2-3	Establish new laboratories and maintain/develop existing ones	2024-2025	Asst. Prof. Dr. Anas Qusay Hashim	Asst. Prof. Dr. Anas Qusay Hashim	1	1
1-3-1	Activate current directions for student participation in scientific forums	2024-2025	Asst. Prof. Dr. Anas Qusay Hashim	Asst. Prof. Dr. Anas Qusay Hashim	1	1
1-3-2	Hold exhibitions and scientific conferences for postgraduate research and undergraduate graduation projects	2024-2025	Lect. Dr. Aseel Mohammed Ali Hussein	Asst. Prof. Dr. Anas Qusay Hashim	1	1
1-3-3	Utilize laboratories and equipment available in research centers for training postgraduate students, conducting their research, and graduation projects	2024-2025	Supervisors	Postgraduate Committee: Dr. Ali Muftin, Dr. Hassanein Ali Lafta, Dr. Alaa Ayed	1	1
1-3-4	Engage students with faculty members in conducting applied scientific research	2024-2025	Lect. Dr. Iman Ghadban Khalil	Asst. Prof. Dr. Anas Qusay Hashim	1	1
1-4-4	Distribute electronic learning kits with study materials	2024-2025	Dr. Alaa Ayed Jabr	Asst. Prof. Dr. Anas Qusay Hashim	1	1

1-5-2	Activate the role of educational platforms and support their contribution to developing the teaching and learning process	2024-2025	Asst. Prof. Dr. Anas Qusay Hashim	Asst. Prof. Dr. Anas Qusay Hashim	1	1
1-5-4	Introduce student assignments focusing on communication and teamwork skills	2024-2025	Course Instructors	Asst. Prof. Dr. Anas Qusay Hashim	1	1
1-5-5	Collaborate with state institutions and the private sector to develop summer training mechanisms	2024-2025	Summer Training Committee: Dr. Donya Tahseen Nima, Assist. Lect. Faten Imad	Asst. Prof. Dr. Anas Qusay Hashim	1	1
1-7-1	Involve students in membership of selected committees	2024-2025	Asst. Prof. Dr. Anas Qusay Hashim	Asst. Prof. Dr. Anas Qusay Hashim	1	1
2-1-1	Collaborate with state institutions to implement practical and research projects related to their needs and provide consultation for their programs	2024-2025	Asst. Prof. Dr. Anas Qusay Hashim	Asst. Prof. Dr. Anas Qusay Hashim	1	1
2-2-1	Encourage and support research published in international journals with impact factors or indexed in Scopus	2024-2025	University Presidency	Course Instructors	1	1
2-2-2	Provide financial and administrative support to participate in reputable international conferences	2024-2025	Asst. Prof. Dr. Anas Qusay Hashim	Asst. Prof. Dr. Anas Qusay Hashim	1	1
2-2-4	Sign Memorandums of Understanding and partnership/research cooperation agreements with local and international research centers	2024-2025	College Dean’s Office	Asst. Prof. Dr. Anas Qusay Hashim	1	1
2-3-3	Utilize professional expertise in state institutions and private companies for joint supervision of postgraduate research projects addressing institutional issues	2024-2025	Postgraduate Committee: Dr. Ali Muftin, Dr. Hassanein Ali Lafta, Dr. Alaa Ayed	Asst. Prof. Dr. Anas Qusay Hashim	1	1

2-4-2	Hold conferences and workshops to establish cooperation with public and private sectors	2024-2025	Asst. Prof. Dr. Anas Qusay Hashim	Asst. Prof. Dr. Anas Qusay Hashim	1	1
2-4-3	Encourage applied research that contributes to the development of industry in Iraq and ways to support it	2024-2025	Lect. Dr. Iman Ghadban Khalil	Asst. Prof. Dr. Anas Qusay Hashim	1	1
2-5-4	Participate in research evaluation with international committees from reputable universities	2024-2025	Faculty Members	Asst. Prof. Dr. Anas Qusay Hashim	1	1
3-1-1	Encourage students and faculty members to participate in volunteer work aimed at serving the community	2024-2025	Faculty Members	Asst. Prof. Dr. Anas Qusay Hashim	1	1
3-1-2	Increase continuous education courses, diversify programs, and provide distance learning opportunities	2024-2025	Asst. Prof. Dr. Sufyan Munther Saleh	Asst. Prof. Dr. Anas Qusay Hashim	1	1
3-3-1	Organize lectures and public seminars directed to the community, either on campus or online	2024-2025	Asst. Prof. Dr. Rana Ibrahim Mahmoud	Asst. Prof. Dr. Anas Qusay Hashim	1	1
3-3-2	Encourage and support awareness initiatives linking the university with society (e.g., integrity initiatives, rationalizing consumption, human rights, educational and psychological guidance, preservation of natural and cultural heritage)	2024-2025	Dr. Iman Ghadban Khalil	Asst. Prof. Dr. Anas Qusay Hashim	1	1
3-4-1	Communicate and interact with Al-Nahrain University alumni	2024-2025	Dr. Samar Ali Jaber, Dr. Muna Mustafa	Asst. Prof. Dr. Anas Qusay Hashim	1	1
3-4-2	Expand the alumni database of Al-Nahrain University since its establishment	2024-2025	Dr. Samar Ali Jaber, Dr. Muna Mustafa	Asst. Prof. Dr. Anas Qusay Hashim	1	1

3-5-1	Organize scientific forums to develop outstanding research activities and ideas originating from the local environment	2024-2025	Faculty Members	Asst. Prof. Dr. Anas Qusay Hashim	1	1
3-5-3	Invite innovators and entrepreneurs from business and industry sectors to hold seminars on creativity and entrepreneurship	2024-2025	Asst. Prof. Dr. Anas Qusay Hashim	Asst. Prof. Dr. Anas Qusay Hashim	1	1
3-6-2	Expand preparation of awareness and guidance posters and brochures	2024-2025	Asst. Prof. Dr. Anas Qusay Hashim	Asst. Prof. Dr. Anas Qusay Hashim	1	1
4-2-4	Activate engineering, medical, and scientific laboratories to generate financial resources for the university	2024-2025	Asst. Prof. Dr. Anas Qusay Hashim	Asst. Prof. Dr. Anas Qusay Hashim	1	1
5-1-1	Effective use of technological tools to simplify administrative and financial procedures	2024-2025	Database Committee	Asst. Prof. Dr. Anas Qusay Hashim	1	1
5-1-3	Develop and improve data/information storage and retrieval through the use of modern and diverse databases	2024-2025	Database Committee	Asst. Prof. Dr. Anas Qusay Hashim	1	1
5-2-1	Utilize the expertise of retired professors in rare specializations to work as emeritus professors	2024-2025	Scientific Committee	Asst. Prof. Dr. Anas Qusay Hashim	1	1
5-2-2	Extend contracts of distinguished university professors in rare specializations	2024-2025	Scientific Committee	Asst. Prof. Dr. Anas Qusay Hashim	1	1
5-3-2	Develop and implement comprehensive training programs based on actual work needs to enhance performance efficiency	2024-2025	Asst. Prof. Dr. Sufyan Munther Saleh	Asst. Prof. Dr. Anas Qusay Hashim	1	1
5-3-5	Provide opportunities for outstanding faculty members (with a Master's degree) to pursue a PhD	2024-2025	Scientific Committee	Asst. Prof. Dr. Anas Qusay Hashim	1	1
5-4-3	Renovate and maintain existing buildings	2024-2025	College Dean’s Office	Asst. Prof. Dr. Anas Qusay Hashim	1	1

5-4-5	Establish laboratories that meet international standards and update existing ones	2024-2025	Laboratory Quality Committee	Asst. Prof. Dr. Anas Qusay Hashim	1	1
5-5-5	Use electronic communication tools between students and faculty members	2024-2025	Dr. Alaa Ayed Jabr, Assist. Lect. Reem Shakir Mahmoud	Asst. Prof. Dr. Anas Qusay Hashim	1	1

1.3 Statement of Program Educational Objectives (PEOs)

The Program Educational Objectives (PEOs) of the Biomedical Engineering (BME) program are periodically reviewed and updated to ensure alignment with the mission of Al-Nahrain University, the College of Engineering, and the evolving needs of the healthcare sector and engineering profession. These objectives are designed to equip graduates with the necessary competencies to excel professionally, ethically, and academically in the field of biomedical engineering.

Within a few years of graduation, BME graduates are expected to achieve the following:

PEO-1: Technical Solution Development

Graduates will design, develop, and implement innovative biomedical engineering solutions, including medical devices, diagnostic systems, and healthcare technologies.

PEO-2: Professional Standards & Ethics

Graduates will demonstrate ethical practice, uphold professional responsibility, and maintain high-quality standards in the development and application of medical technologies.

PEO-3: Leadership & Collaboration

Graduates will effectively lead and collaborate within multidisciplinary teams across healthcare, research, and industrial environments.

PEO-4: Continuous Learning & Innovation

Graduates will engage in lifelong learning, professional development, and continuing education to remain current with technological advancements and to advance biomedical engineering knowledge and applications.

PEO-5: Healthcare Systems Engineering

Graduates will analyze healthcare needs and implement effective solutions through requirements engineering, quality assurance processes, and evidence-based practices.

PEO-6: Professional Advancement

Graduates will pursue further study, specialized training, and meet the academic and professional requirements necessary for obtaining engineering licensure, ensuring competence and recognition as professional engineers.

The BME program's PEOs are fully aligned with the mission of Al-Nahrain University and the College of Engineering, aiming to produce graduates capable of advancing biomedical technologies, contributing to healthcare improvement, pursuing continuing education, and fulfilling professional licensure requirements.

1.4 PEOs Consistency with the Mission Statement

The Program Educational Objectives (PEOs) of the Biomedical Engineering (BME) program are aligned with the Program Mission Statement. Both the mission and the PEOs emphasize the preparation of graduates who are professionally competent, ethically responsible, technically proficient, and capable of contributing effectively to healthcare, research, and community service.

The consistency between the program mission statement and the PEOs is demonstrated in Table 1.2, showing how each educational objective supports the program's mission and its goals of excellence in education, research, and community engagement.

Table 1.2: The consistency of the department mission statements with the (PEOs).

No.	Program Educational Objectives (PEOs)	Consistency with the Department Mission
1	**PEO-1: Technical Solution Development**	Excellence in education, technical proficiency, innovation in biomedical engineering solutions
2	**PEO-2: Professional Standards & Ethics**	Ethical practices, professional responsibility, and adherence to quality standards

3	**PEO-3: Leadership & Collaboration**	Leadership, effective communication, and interdisciplinary collaboration in healthcare and research environments
4	**PEO-4: Continuous Learning & Innovation**	Lifelong learning, continuous professional development, and research engagement
5	**PEO-5: Healthcare Systems Engineering**	Addressing community healthcare needs, applying requirement engineering and quality assurance to improve health outcomes
6	**PEO-6: Professional Advancement**	Pursuit of further education, professional certifications, and effective use of modern biomedical engineering tools

Therefore, the BME program's educational objectives (PEOs) directly support the Program Mission by preparing graduates who are capable of advancing biomedical technologies, meeting professional licensure requirements, engaging in lifelong learning, and contributing effectively to society and healthcare systems.

1.5 Program Constituencies

This program will give a position to the university by graduating BME engineers to meet the requirements of the business market. The main constituencies of the program are:

1- Students:

Students have a clear interest in having a broad knowledge of the program related principles, tools, and theories as this prepares them for their careers and helps them secure jobs locally and internationally. The importance of student engagement is reiterated in student forums discussions, the course surveys, and the alumni surveys. All students were participated in the evaluation, all years through assessments and final year through exit survey.

2- Faculty:

Faculty members in the BME Department include the BME staff and some staff from the university who teach/support other engineering courses. Many other staff members contribute to the support of the BME department; these include all laboratory technicians and staff from other departments, IT unit personnel, and others.

All faculties participated in the evaluation through a specially intended questionnaire in September and through students' assessments.

3- Alumni:

Alumni are clearly influenced by the department's reputation, as this would help them advance their careers. They frequently contact faculty for recruitment purposes. They want to make sure the program adequately prepares them for advancement in the careers. The alumni were participated in the evaluation through alumni survey.

4- Employers:

Employers or industry partners have indicated that they have a clear interest in having students prepared upon entering the workforce. Clearly, the technical and personal preparation of the students is instrumental.

The Biomedical Engineering Department has established an Industrial Advisory Board (IAB), composed of six experienced leaders from diverse sectors within the biomedical and healthcare technology industry. The IAB meets annually and plays a vital role in curriculum development and the continuous improvement of the Biomedical Engineering program, aligning it with current and anticipated industry needs. The board also provides feedback through bi-annual meetings and annual surveys.

Key requirements identified by the Ministry and industry partners include the development of general professional skills—such as ethics, teamwork, communication, and hands-on training—as well as strengthening certain scientific and technical courses, particularly those involving computer applications in biomedical engineering. These requirements were

thoroughly discussed within the Biomedical Engineering Department Council, and specific actions were taken to implement the necessary adjustments.

The most recent joint meeting between the Biomedical Engineering Department Council and the Industrial Advisory Board was held on 10/01/2025. The IAB members and their roles are listed in Table 1.3

Table 1.3 IAB Members

NO	Name	Position
1	Prof. Dr. Auns Qusay Hashim	Al-Nahrain University / Head of Biomedical Engineering Department
2	Asst. Prof. Dr. Hadeel Qasim Wadi	Al-Nahrain University / Biomedical Engineering Department
3	Prof. Dr. Ali Hussain Ali	Baghdad University / Al-Khawarizmy Collage of Engineering / Biomedical Engineering Department
4	Eng. Aqeel Abdulkhalik Abdulhadi	Private Sector / Medical Company
5	Eng. Sara Mohammed Hussain	The Ministry of Health / Central Office
6	Eng. Muhanad Abduljabar Mohammed	Civil Society Organizations
7	Eng. Ali Faisal	The Ministry of Health / Central Office

The meeting covered the following topics:

1. Reviewing the program's educational objectives to ensure they reflect the professional competencies of graduates and meet the expectations of all stakeholders.

2. Reviewing learning outcomes in line with the graduate specifications outlined in the national standards document for Iraqi engineering colleges, while also considering international standards, societal and environmental responsibilities, and professional ethics. Students were encouraged to contribute to improving quality of life, promoting sustainability, and preserving the environment, heritage, and cultural values.

3. Reviewing the curriculum and implementation strategies to ensure the program provides a comprehensive education that enables graduates to apply knowledge, skills, and professional behaviors in biomedical engineering practice.

4. Discussing the current and future needs of the local and regional biomedical technology labor market, and providing recommendations for curriculum enhancement accordingly.

1.6 PEOs Review Process

The The BME Department at UN has established a program that continues to meet the educational objectives and outcomes as evidenced by the success of graduates, program reputation with employers, and the demand for the program. Table 1.3 summarizes the process to review the PEOs of the BME program. The PEOs were reviewed and evaluated based on surveys taken from various categories.

The process of review and evaluation of the BME program is done through the following assessment channels:

Alumni survey.

1. Employer’s survey.
2. Faculty discussion.
3. Student’s survey.
4. Industry consultations.

Table 1.4: Summary of the process to review the PEOs

Step #	Issue	Trigger/Action/Outcome
1	Review the PEOs regularly to ensure that they are directly linked to the undergraduate educational missions of the College and University.	Review of the University and College Undergraduate educational missions and strategic plans and consider their impact on the PEOs.
2	Ensure that the PEOs are consistent with published PEOs of other similar programs, noting that the PEOs should be specific to our program.	The Department Accreditation Committee reviews published PEOs of various similar Programs offered locally, regionally and internationally, including those of Accreditation Board for Engineering and Technology (ABET)-accredited mechanical engineering programs. As a result, valuable data are collected for guidance, comparison and benchmarking purposes.
3	Ensure that the PEOs reflect the hopes and needs of our constituents and convey the reality and unique qualities of our program.	In reviewing the PEOs, the Department Accreditation Committee tries to answer the following questions: **a.** What do our constituents expect our students to be doing a few years after graduation. **b.** What are our alumni actually doing now as well as a few years after graduation; and **c.** How can we convey and express the hopes/expectations of our constituents and the actual achievements of our graduates in few short statements. The answers to these questions provided the basis to review the PEOs.
4	Formally assess the adequacy, relevance, and achievement of the PEOs.	Conduct formal surveys to achieve the following: **a.** Consult the program constituents on the adequacy and relevance of the PEOs Assess the level of achievement of the PEOs; and **b.** Collect relevant data about the achievement of the PEOs.

CRITERION 2: GRADUATE OUTCOMES

2.1 Adopted Graduate Outcomes

Students of BME program will attain (by the time of graduation):

1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply the engineering design process to produce solutions that meet specified needs with consideration for public health and safety, and global, cultural, social, environmental, economic, and other factors as appropriate to the discipline.
3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
4. An ability to communicate effectively with a range of audiences.
5. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
6. An ability to recognize the ongoing need to acquire new knowledge, to choose appropriate learning strategies, and to apply this knowledge.
7. An ability to function effectively as a member or leader of a team that establishes goals, plans tasks, meets deadlines, and creates a collaborative and inclusive environment.

The GOs are published on the web site:

https://www.eng.nahrainuniv.edu.iq/page.php?id=492

2.2 Relations of Program Outcomes to Program Educational Objectives

The program outcomes are closely linked to the program educational objectives. The relationship illustrating the program outcomes serving each objective is mapped in Table (3.1).

Table 2.1: Mapping of Program educational objectives to graduate outcomes

PEOs	Graduation Outcomes						
	GO-1	GO-2	GO-3	GO-4	GO-5	GO-6	GO-7
PEO-1	✔	✔	✔				
PEO-2					✔		
PEO-3					✔		
PEO-4				✔			✔
PEO-5	✔	✔					
PEO-6					✔		✔

CRITERION 3: CURRICULUM

3.1 Program Structure and Content

The curriculum of BME department that has launched in the academic year of 2020-2021 and generally consists of three main categories of courses namely, math and basic science (College Requirements), engineering topics (Department Requirements) and others (University Requirements), which involve languages and human rights and democracy.

3.1.1 Study Plan

In the first semester of the first year, the students study some basic sciences courses where the basic concepts must be understood. Some other general courses also are given in this semester as a university requirement. In the second semester of the first year, some basic engineering courses are included where most of them are college requirements.

In the first semester of the second year, the students start studying the first part of basic courses of mechanical engineering. These courses focus on the fundamental concept of the specialty of mechanical engineering. The second semester of this year considers as an extension of the first semester where the main courses are the second part of the first semester's courses. Topics of these courses deeply undertake and sometimes give some applications.

In the third and fourth years of the program, the courses become more specific. The first semester includes some of these courses and other secondary courses. The second semester includes the other especially courses but some of them are an extension to those in the first semester. In the last year, the students have the ability to design, where the courses are almost dealing with design topics. Some of these courses are required and other is elective. It is worthy of interesting that these courses are chosen according to priority and importance to be in the first or second semester. Also, this year, the students perform the graduation project during the two semesters, where they devote their efforts through what they have learned in all stages. Table 3.1 shows the details of the curriculum and the units of this program.

The curriculum is always updated and to be fit with the labor market, so the elective courses are constantly updated according to the recommendations of the advisory board and employers.

In Biomedical engineering department, each curricular is described by:

1. Curricular code:

- UREQ: university requirement
- CREQ: College requirement
- MDER: Department requirement

2. Curricular/Course Number and Title: each course is coded as:

   Course Number = MDER + X X X

   - 1st digit refers to the level: first, second, third, fourth, fifth
   - 2nd digit refers to the semester: first and second
   - 3rd digit: represented by numbers from 1 to 8 to describe the sequence of the course in each semester

3. **Required** (R) courses are required for all students in the program, **elective €** courses (often referred to as open or free electives) are optional for students, and **selected elective** (SE) courses are those for which students must take one or more courses from a specified group.
4. For courses that include multiple elements (lecture, laboratory, recitation, etc.), indicate the maximum enrollment in each element. For selected elective courses, indicate the maximum enrollment for each option.

Table 3.1: Curriculum for the Department of Biomedical Engineering (2024-2025)

Course			Required, Elective or Selected Elective	Subject Area			Design Units	Last Two Terms the Course was Offered: Year and Semester	Maximum Section Enrollment for the Last Two Terms the Course was Offered
Year	Code	Title		Math & Basic Sciences	Engineering Topics.	Others			
First Year	UREQ110	Human Rights	R			1	✗	F24, F23	23; 21
	UREQ111	Computer Fundamentals and Programming I	R			2	✗	F24, F23	23; 21
	MATH110	Mathematics I	R	3			✗	F24, F23	23; 21
	CREQ110	Engineering Drawings	R		2		✓	F24, F23	23; 21
	CREQ111	Workshop Technology	R		1		✓	F24, F23	23; 21
	PHYS110	Physics	R	3			✗	F24, F23	23; 21
	MDER110	Chemistry	R	3			✗	F24, F23	23; 21
	MDER111	Electrical Circuits I	R		3		✓	F24, F23	23; 21
	UREQ120	Arabic Language I	R			1	✗	S25, S24	23; 21
	UREQ121	English Language I	R			2	✗	S25, S24	23; 21
	MATH120	Mathematics II	R	3			✗	S25, S24	23; 21
	CREQ120	Engineering Graphics	R		2		✓	S25, S24	23; 21
	MDER120	Biophysics	R	2			✗	S25, S24	23; 21
	MDER121	Biochemistry	R	3			✗	S25, S24	23; 21
	MDER123	Computer Programming	R		2		✗	S25, S24	23; 21
	MDER122	Electrical Circuits II	R		4		✓	S25, S24	23; 21

Course			Required, Elective or Selected Elective	Subject Area			Design Units	Last Two Terms the Course was Offered: Year and Semester	Maximum Section Enrollment for the Last Two Terms the Course was Offered
Year	Code	Title		Math & Basic Sciences	Engineering Topics.	Others			
Second year	UREQ210	English II	R			2	✗	F24, F23	23; 21
	UREQ211	Principles of Management	R			1	✗	F24, F23	23; 21
	UREQ212	Arabic Language II	R			1	✗	F24, F23	23; 21
	UREQ213	Computer Fundamentals and Programming II	R		2		✗	F24, F23	23; 21
	MATH210	Mathematics III	R	3			✗	F24, F23	23; 21
	MDER210	Engineering Mechanics I	R		3		✓	F24, F23	23; 21
	MDER211	Material Science	R		3		✓	F24, F23	23; 21
	MDER212	Electronics I	R		3		✓	F24, F23	23; 21
	MDER213	Cell Biology	R	2			✗	F24, F23	23; 21
	UREQ220	Democracy	R			1	✗	S25, S24	23; 21
	MATH220	Mathematics IV	R	3			✗	S25, S24	23; 21
	MDER220	Engineering Mechanics II	R		3		✓	S25, S24	23; 21
	MDER221	Electronics II	R		3		✓	S25, S24	23; 21
	MDER222	Electromagnetic fields	R		2		✓	S25, S24	23; 21
	MDER223	Limbs Anatomy	R			3	✗	S25, S24	23; 21
	MDER224	Electrical Networks	R		2		✓	S25, S24	23; 21

Course			Required, Elective or Selected Elective	Subject Area			Design Units	Last Two Terms the Course was Offered: Year and Semester	Maximum Section Enrollment for the Last Two Terms the Course was Offered
Year	Code	Title		Math & Basic Sciences	Engineering Topics.	Others			
	MDER225	Optical System Design	R		2		✓	S25, S24	23; 21
	MDER226	Introduction to BME	R		1		✗	S25, S24	23; 21
Third year	MDER310	Engineering Analysis	R	3			✓	F24, F25	42; 34
	MDER311	Mechanics of Materials I	R		2		✓	F24, F25	42; 34
	MDER312	Trunk Anatomy	R			3	✗	F24, F25	42; 34
	MDER313	Physiology I	R			3	✗	F24, F25	42; 34
	MDER314	Histology	R			3	✗	F24, F25	42; 34
	MDER315	Electronics III	R		2		✓	F24, F25	42; 34
	MDER316	Medical Equipment I	R		3		✓	F24, F25	42; 34
	MDER317	Experimental Design	R		1		✗	F24, F25	42; 34
	UREQ320	English III	R			2	✗	S24, S25	42; 34
	CREQ320	Engineering Statistics	R	2			✗	S24, S25	42; 34
	MDER320	Numerical Analysis	R	3			✓	S24, S25	42; 34
	MDER321	Mechanics of Materials II	R		3		✓	S24, S25	42; 34
	MDER322	Head & Neck Anatomy	R			3	✗	S24, S25	42; 34
	MDER323	Physiology II	R			3	✗	S24, S25	42; 34
	MDER324	Medical Equipment II	R		2		✓	S24, S25	42; 34

Course			Required, Elective or Selected Elective	Subject Area			Design Units	Last Two Terms the Course was Offered: Year and Semester	Maximum Section Enrollment for the Last Two Terms the Course was Offered
Year	Code	Title		Math & Basic Sciences	Engineering Topics.	Others			
	MDER325	Bone Injury and Fractures	R			2	✗	S24, S25	42; 34
Fourth year	UREQ410	English IV	R			2	✗	F24, F25	45; 42
	MDER410	Biomechanics I	R		3		✓	F24, F25	45; 42
	MDER411	Biomaterials I	R		2		✓	F24, F25	45; 42
	MDER412	Communications	R		3		✓	F24, F25	45; 42
	MDER413	Medical Instrumentation	R		3		✓	F24, F25	45; 42
	MDER414	Digital Electronics I	R		3		✓	F24, F25	45; 42
	MDER415	Thermo-Fluid Mechanics I	R		2		✓	F24, F25	45; 42
	MDER416	Pathology	R			2	✗	F24, F25	45; 42
	MDER420	Biomechanics II	R		3		✓	S24, S25	45; 42
	MDER421	Biomaterials II	R		2		✓	S24, S25	45; 42
	MDER422	Telemedicine	R		2		✓	S24, S25	45; 42
	MDER423	Analytical Mechanics	R		2		✓	S24, S25	45; 42
	MDER424	Therapeutic Instrumentation	R		3		✓	S24, S25	45; 42
	MDER425	Digital Electronics II	R		3		✓	S24, S25	45; 42
	MDER426	Thermo-Fluid Mechanics II	R		2		✓	S24, S25	45; 42

Course			Required, Elective or Selected Elective	Subject Area			Design Units	Last Two Terms the Course was Offered: Year and Semester	Maximum Section Enrollment for the Last Two Terms the Course was Offered
Year	Code	Title		Math & Basic Sciences	Engineering Topics.	Others			
	MDER427	Image Processing	R		3		✓	S24, S25	45; 42
Fifth year	UREQ510	Professional Ethics	R			1	✗	F24, F25	45
	CREQ510	Project	R		2		✓	F24, F25	43
	MDER510	Control I	R		2		✓	F24, F25	45
	MDER511	Diagnostic Instrumentation	R		3		✓	F24, F25	45
	MDER512	Hospital System & Design	R		2		✓	F24, F25	45
	MDER513	Microprocessor	R		3		✓	F24, F25	45
	MDER514	Neural Networks	R		2		✓	F24, F25	45
	MDER515	Elective I	E		2		✗	F24, F25	45
	MDER516	Elective II	SE		2		✗	F24, F25	45
	CREQ520	Engineering Management	R		1		✗	S24, S25	45
	CREQ521	Project	R		2		✓	S24, S25	45
	MDER520	Control II	R		3		✓	S24, S25	45
	MDER521	Modern Medical Equipment	R		2		✓	S24, S25	45
	MDER522	Biotribology	R		2		✓	S24, S25	45

Course			Required, Elective or Selected Elective	Subject Area			Design Units	Last Two Terms the Course was Offered: Year and Semester	Maximum Section Enrollment for the Last Two Terms the Course was Offered
Year	**Code**	**Title**		**Math & Basic Sciences**	**Engineering Topics.**	**Others**			
	MDER523	Biomedical Sensors	R		2		✓	S24, S25	45
	MDER524	Elective III	E		2		✗	S24, S25	45
	MDER525	Elective IV	E		3		✗	S24, S25	45
Overall credit hours for completion of the program				**33 hrs**	**122 hrs**	**38 hrs**		**Total = 193 hrs.**	

In the year (2023 - 2024), Ministry of Higher Education and Scientific Research in Iraq followed a new curriculum of education called the Bologna process to obtain Bachelor's degree. Bologna process consists of five years (ten semesters) - 300 European Credit Transfer and Accumulation System (ECTS) credits, where 1 ECTS is about 25 hours of work. Student Workloads (SWL) were calculated as structured such as lectures, labs and tutorials and unstructured such as given homework assignments. The evaluation of this program is based on assignments, exams, participations, and reports. Tables 3.2 summarize the graduation requirements.

Table 3.2: Graduation Requirements for Bologna process

Republic of Iraq - Ministry of Higher Education and Scientific Research Al-Nahrain University Bachelor's degree in Biomedical Engineering (First cycle) Five years (Ten semesters) - 300 ECTS credits - 1 ECTS = 25 hr Program Curriculum (2023 - 2024)	جمهورية العراق - وزارة التعليم العالي والبحث العلمي جامعة النهرين بكالوريوس في هندسة الطب الحياتي (الدورة الأولى) خمس سنوات (عشرة فصول دراسية) - 300 وحدة اوربية - كل وحدة اوربية = ٢٥ ساعة المنهاج الدراسي للعام ٢٠٢٣-٢٠٢٤

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
UGI	One	1	CREQ180	Chemistry	الكيمياء	English	3		2				4	79	46	125	5.00	B	
		2	MATH110	Mathematics	الرياضيات	English	4				1		3	78	47	125	5.00	B	
		3	URCOM110	Computer Fundamentals and Programming	برمجة الحاسب الآلي	English	2		2				3	63	37	100	4.00	B	
		4	CREQ110	Engineering Drawings	الرسم الهندسي	English	1		2		1		3	63	62	125	5.00	S	
		5	BIOL110	Biology	الاحياء	English	2				1		3	48	52	100	4.00	B	
		6	MDER110	Electrical Circuits I	الدوائر الكهربائية 1	English	2		3		1		4	94	31	125	5.00	B	
		7	URDEM110	Human Rights+ Democracy	حقوق الانسان والديمقراطية	Arabic	2						3	33	17	50	2.00	S	
						Total	16	0	9	0	4	0	23	458	292	750	30.00		

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
UGI	Two	1	PHYS110	Physics	الفيزياء	English	3		2		1		3	93	57	150	6.00	B	
		2	MATH120	Fundamentals of Engineering Mathematics	أساسيات الرياضيات الهندسية	English	4				1		3	78	72	150	6.00	B	
		3	CREQ121	Computer Fundamentals and Programming II	برمجة الحاسب الآلي 2	English	2		2				4	64	61	125	5.00	B	
		4	CREQ120	Engineering Graphics	الاظهار الهندسي	English	2		2		1		3	78	47	125	5.00	S	
		5	MDER120	Electrical Circuits II	الدوائر الكهربائية 2	English	3		2		1		4	94	56	150	6.00	B	
		6	UREQ110	Wokshop	تكنلوجيا الورش	Arabic				3			3	48	2	50	2.00	B	
						Total	14	0	8	3	4	0	20	455	295	750	30.00		

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
UGII	Three	1	MDER210	Fundamentals of Electronics	اساسيات الالكترونيك	English	4		3		1		3	123	27	150	6.00	C	
		2	MDER211	Engineering Mechanics (Static)	الميكانيك الهندسي (الساكن)	English	4				2		3	93	82	175	7.00	B	
		3	URENG1	English Language	اللغة الانكليزية	English	2						3	33	17	50	2.00	B	
		4	MDER213	Thorax and Limbs Anatomy	تشريح الصدر والاطراف	English	2		2		1		3	78	47	125	5.00	C	
		5	MATH210	Engineering Mathematics	رياضيات هندسية	English	4				1		3	78	72	150	6.00	B	
		6	URBRC	Crimes of Defunct Baath Party	جرائم نظام البعث في العراق	Arabic	2						3	33	17	50	2.00	B	
		7	URARA	Arabic	اللغة العربية	Arabic	2						3	33	17	50	2.00	B	
						Total	20	0	5	0	5	0	21	471	279	750	30		

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
UGII	Four	1	MDER220	Electronic Circuits	الدوائر الالكترونية	English	2		3		1		3	93	32	125	5.00	C	
		2	MDER221	Engineering Mechanics (Dynamics)	الميكانيك الهندسي (الحركي)	English	5				1		3	93	32	125	5.00	B	
		3	MDER222	Abdomen and Head Anatomy	تشريح البطن والراس	English	2		2		1		3	78	47	125	5.00	C	
		4	MATH220	Analytic Mathematics	رياضيات تحليلية	English	4				1		3	78	72	150	6.00	B	
		5	MDER223	Introduction to BME	مقدمة في الهندسة الطبية	English	2						3	33	42	75	3.00	C	
		6	MANG220	Principle of Management	مبادئ الادارة	English	2						3	33	17	50	2.00	S	
		7	URENG2	Academic English Language	اللغة الانكليزية الاكاديمية	English	2						3	33	17	50	2.00	B	
		8	URARA2	Arabic II	اللغة العربية 2	Arabic	2						3	33	17	50	2.00	B	
						Total	21	0	5	0	4	0	24	474	276	750	30		

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
UGIII	Five	1	MDER310	Elective I	مواد مختارة 1	English	2				1		3	48	52	100	4.00	E	
		2	MDER311	Engineering Analysis	التحليلات الهندسية	English	4				1		3	78	47	125	5.00	C	
		3	MDER312	Optical Systems Design	تصميم التقنيات البصرية	English	3				1		3	63	37	100	4.00	C	
		4	MDER313	Systemic Physiology	فسلجة اجهزة الجسم	English	2		3				3	78	47	125	5.00	C	
		5	MDER314	Medical Measurement Instrumentation	اجهزة القياس الطبية	English	3		2		1		3	93	57	150	6.00	C	MDER220
		6	MDER315	Biomaterials	المواد الحيوية	English	3		2		1		3	93	57	150	6.00	C	
						Total	17	0	7	0	5	0	18	453	297	750	30.00		

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
UGIII	Six	1	STAT320	Statistics	الاحصاء	English	3				1		3	63	62	125	5.00	B	
		2	MDER320	Mechanics of Materials	ميكانيك المواد	English	4		2		1		3	108	42	150	6.00	C	MDER221
		3	MDER321	Regional Physiology	الفسلجة الموقعية	English	2		3				3	78	47	125	5.00	C	
		4	MDER322	Therapeutic Instrumentation	الاجهزة العلاجية	English	3		2				3	78	72	150	6.00	C	
		5	MDER323	Biomaterials Applications	تطبيقات المواد الحيوية	English	4						3	63	37	100	4.00	C	
		6	MDER324	Numerical Analysis	التحليلات العددية	English	2		2				3	63	37	100	4.00	S	
						Total	18	0	9	0	2	0	18	453	297	750	30.00		

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
UGIV	Seven	1	MDER410	Elective II	مواد مختارة 2	English	3				1		3	63	37	100	4.00	E	
		2	MDER411	Fundamental Biomechanics	مبادئ الميكانيك الاحيائي	English	2		2		1		3	78	72	150	6.00	C	
		3	MDER412	Signal Processing	معالج الاشارة	English	3				1		3	63	37	100	4.00	C	
		4	MDER413	Combinational Digital Electronics	الالكترونيك الرقمي الحسابي	English	2		2		1		3	78	47	125	5.00	C	
		5	MDER414	Histo-pathology	علم الامراض والانسجة	English	4		2		1		3	108	42	150	6.00	C	MDER212
		6	MDER415	Medical Imaging Instruments	اجهزة التصوير الطبية	English	2		2				3	63	62	125	5.00	C	
						Total	16	0	8	0	5	0	18	453	297	750	30.0		

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
	Eight	1	MDER420	Bio-Fluid Mechanics	ميكانيك الموائع الحيوية	English	5						3	78	22	100	4.00	C	
		2	MDER421	Biomechanics of Motion	الميكانيك الاحيائي الحركي	English	3		2				3	78	72	150	6.00	C	MDER221
		3	MDER422	Medical Communications	الاتصالات الطبية	English	3		3				3	93	57	150	6.00	C	
		4	MDER423	Image Processing	معالج الصور	English	2		2				3	63	37	100	4.00	C	
		5	MDER424	Sequential Digital Electronics	الالكترونيك الرقمي التتابعي	English	2		2		1		3	78	47	125	5.00	C	
		6	MDER425	Medical Imaging Instruments Applications	تطبيقات اجهزة التصوير الطبية	English	2		2				3	63	62	125	5.00	C	
						Total	17	0	11	0	1	0	18	453	297	750	30.0		

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
UGV	Nine	1	UREQ520	Engineering Management	الادارة الهندسية	English	4				1		3	78	22	100	4.00	S	
		2	PROJ411	Project I	مشروع التخرج 1	English			6				3	93	7	100	4.00	C	
		3	MDER510	Classic Control	السيطرة الكلاسيكية	English	3		2				3	78	72	150	6.00	C	MDER311
		4	MDER511	Diagnostic Medical Equipment	الاجهزة التشخيصية	English	2		2		1		3	78	72	150	6.00	C	MDER414
		5	MDER512	Elective III	مواد مختارة 3	English	4						3	63	62	125	5.00	E	
		6	MDER513	Elective IV	مواد مختارة 4	English	4						3	63	62	125	5.00	E	
						Total	17	0	10	0	2	0	18	453	297	750	30.0		

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
	Ten	1	PRET310	Professional Ethics	اخلاقيات المهنة	Arabic	2						3	33	42	75	3.00	S	
		2	PROJ422	Project I	مشروع التخرج 2	English			6				3	93	7	100	4.00	C	
		3	MDER520	Modern Control	السيطرة الحديثة	English	3		2		1		3	93	57	150	6.00	C	MDER311
		4	MDER521	Artificial Organs and Prostheses	الاعضاء الصناعية البديلة	English	4				1		3	78	72	150	6.00	C	
		5	MDER522	Biomedical Sensors	المتحسسات الاحيائية	English	3				2		3	78	72	150	6.00	C	MDER210
		6	MDER523	Elective V	مواد مختارة 5	English	4				1		3	78	47	125	5.00	E	
						Total	16	0	8	0	5	0	18	453	297	750	30.0		
						Total	172	0	80	3	37	0	196	4576	2924	7500	300.0		Must be 300 ECTS

Note: The student should complete 4 weeks of Summer Internships to fullfil the requirements of the Bachelor's degree

Structured SWL (hr/w) type		
	CL	Class Lecture
	Lab	Laboratory
	Pr	Practical Training
	Tut	Tutorial
	Lect	Online lecture
	Semn	Seminar

Module type				
	B	Basic learning activities	46	SWL: Student Workload
	C	Core learning activity	116.5	SSWL: Structured SWL
	S	Suport or related learning activity	26	USSWL: Unstructured SWL
	E	Elective learning activity	16	FS=57.5, FE=31.5 ED=73.5, HSS=20

46+116.5+16+26= 204.5*2/3= 136.3/2= 68.1 > C(132.5>60)

Note: Columns O, Q and R are progrmaed, protected and should not be edited

First Year.

First Semester

No.	CODE	SUBJECT	Hrs Per Week			Units	Cumulative Units
			Th	App			
1	CREQ180	Chemistry	3	2	6	3	3
2	MATH110	Mathematics	4		8	3	6
3	URCOM111	Computer Fundamentals and Programming I	2	2	10	2	8
4	CREQ110	Engineering Drawings	1	2	13	2	10
5	BIOL110	Biology	2		17	3	13
6	MDER110	Electrical Circuits I	2	3	18	4	17
7	URDEM110	Human Rights+ Democracy	2	2	18	1	18
Total			16	8	5	18	18
			29				

Second Semester

No.	CODE	SUBJECT	Hrs Per Week			Units	Cumulative Units
			Th	App	Tut		
1	PHYS110	Physics	3	2	1	3	21
2	MATH120	Fundamentals of Engineering Mathematics	4		2	4	25
3	CREQ121	Computer Fundamentals and Programming II	2	1		3	28
4	CREQ120	Engineering Graphics	2	2	1	3	31
5	MDER120	Electrical Circuits II	3	2	1	4	35
6	UREQ110	Workshop	3			2	37
Total			17	7	5	19	37
			30				

Second Year

First Semester

No.	CODE	SUBJECT	Hrs Per Week			Units	Cumulative Units
			Th	App	Tut		
1	MDER210	Electronics I	4	3	1	4	41
2	MDER211	Engineering Mechanics I	4		2	4	45
3	ENGL230	English Language II	2			2	47
4	MDER213	Anatomy I	2	2	1	3	50
5	MATH210	Engineering Mathematics	4		1	3	53
6	CREQ122	Crimes of Defunct Baath Party	2			2	55
7	ARER326	Arabic	2			2	57
Total			20	5	5	20	57
			30				

Second Semester

No.	CODE	SUBJECT	Hrs Per Week			Units	Cumulative Units
			Th	App	Tut		
1	MDER220	Electronics II	4	3	1	6	63
2	MDER221	Engineering Mechanics II	5		1	5	68
3	MDER222	Anatomy II	2	2	1	5	73
4	MATH220	Analytic Mathematics	4		1	6	79
5	MDER223	Introduction to BME	2			4	83
6	MANG210	Principle of Management	2			2	85
7	ENGL230	English Language II	2			2	87
Total			21	5	4	30	87
			30				

Third Year

First Semester

No.	CODE	SUBJECT	Hrs. Per Week			Units	Cumulative Units
			Theo.	App.	Tut.		
1	MDER310	Engineering Analysis	3		1	3	90
2	MDER311	Mechanics of Materials I	2		1	2	92
3	MDER312	Trunk Anatomy	2	2		3	95
4	MDER313	Physiology I	2	3		3	98
5	MDER314	Histology	2	2		3	101
6	MDER315	Electronics III	2		1	2	103
7	MDER316	Medical Equipment I	2	2		3	106
8	MDER317	Experimental Design		2		1	107
Total			15	11	3	20	107
			29				

Second Semester

No.	CODE	SUBJECT	Hrs Per Week			Units	Cumulative Units
			Th	App	Tut		
1	UREQ320	English III	2			2	109
2	CREQ320	Engineering Statistics	2			2	111
3	MDER320	Numerical Analysis	2	2		3	114
4	MDER321	Mechanics of Materials II	2	2	1	3	117
5	MDER322	Head & Neck Anatomy	2	2		3	120
6	MDER323	Physiology II	2	3		3	123
7	MDER324	Medical Equipment II	2			2	125
8	MDER325	Bone Injury and Fractures	2			2	127
Total			16	9	1	20	127
			26				

Fourth Year

First Semester

No.	CODE	SUBJECT	Hrs Per Week			Units	Cumulative Units
			Th	App	Tut		
1	UREQ410	English IV	2			2	129
2	MDER410	Biomechanics I	2	3		3	132
3	MDER411	Biomaterials I	2			2	134
4	MDER412	Communications	2	3	1	3	137
5	MDER413	Medical Instrumentation	2	2		3	140
6	MDER414	Digital Electronics I	2	2		3	143
7	MDER415	Thermo-Fluid Mechanics I	2		1	2	145
8	MDER416	Pathology	2			2	147
Total			16	10	2	20	147
			28				

Second Semester

No.	CODE	SUBJECT	Hrs Per Week			Units	Cumulative Units
			Th	App	Tut		
1	MDER420	Biomechanics II	2	3		3	150
2	MDER421	Biomaterials II	2			2	152
3	MDER422	Telemedicine	2			2	154
4	MDER423	Analytical Mechanics	2			2	156
5	MDER424	Therapeutic Instrumentation	2	2		3	159
6	MDER425	Digital Electronics II	2	3	1	3	162
7	MDER426	Thermo-Fluid Mechanics II	2			2	164
8	MDER427	Image Processing	2	2		3	167
Total			16	10	1	20	167
			27				

Fifth Year

First Semester							
No.	CODE	SUBJECT	Hrs Per Week			Units	Cumulative Units
			Th	App	Tut		
1	UREQ510	Professional Ethics	1			1	168
2	CREQ510	Project		6		2	170
3	MDER510	Control I	2		1	2	172
4	MDER511	Diagnostic Instrumentation	2	2		3	175
5	MDER512	Hospital System & Design	2			2	177
6	MDER513	Microprocessor	2	3		3	180
7	MDER514	Neural Networks	2			2	182
8	MDER515	Elective I	2			2	184
9	MDER516	Elective II	2			2	186
Total			15	11	1	19	186
			27				
Second Semester							
No.	CODE	SUBJECT	Hrs Per Week			Units	Cumulative Units
			Th	App	Tut		
1	CREQ520	Engineering Management	1			1	187
2	CREQ521	Project		6		2	189
3	MDER520	Control II	2	3	1	3	192
4	MDER521	Modern Medical Equipment	2			2	194
5	MDER522	Biotribology	2			2	196
6	MDER523	Biomedical Sensors	2			2	198
7	MDER524	Elective III	2			2	200
8	MDER525	Elective IV	2	2		3	203
Total			13	11	1	17	203
			25				

3.1.2 Alignment with PEOs

Figure 3.1 and Table 3.3 illustrate the relationship between the Program Educational Objectives (PEOs) and the National Graduate Outcomes (GOs). The achievement of the Graduate Outcomes (GOs) ensures that our graduates are well equipped to achieve the Program Educational Objectives in actual practice 3-5 years following graduation.

BME Program Educational Objectives (PEOs) are as follows:

PEO-1: Professional Presence

As a result, within a few years, the graduate has established an Internet presence, either through professional organizations, social networking and/or other activities which demonstrate an appreciation and use of modern technological capabilities.

PEO-2: Ethics and Standards

As a result, within a few years of graduation, the graduate will demonstrate adherence to the professional codes of conduct appropriate to his or her field of study and/or practice, as well as exhibit behavior consistent with accepted standards of fiduciary responsibility, risk/benefit analysis and professional accountability

PEO-3: Leadership, communication, and collaboration

As a result, within a few years of graduation, the graduate will have made significant or meaningful contributions in his or her chosen field,

Moreover, graduates will have outstanding communication skills as evidenced by their professional presentations, and in their productive interactions with co-workers. Furthermore, the graduate will be working independently and in multidisciplinary teams to effectively and efficiently achieve personal and organizational goals, engage in community or public service, create a product or construction that fills a social need, and/or participate in educating individuals about an issue of societal concern.

PEO-4: Lifelong learning

As a result, graduates will identify opportunities to contribute to society from a variety of positions, ranging from hospital management, equipment maintenance, management and design and engage professionally in private and governmental sectors such as healthcare centers,

Medical companies, and marketing. The graduate may also pursue further education in the form of graduate and professional degrees.

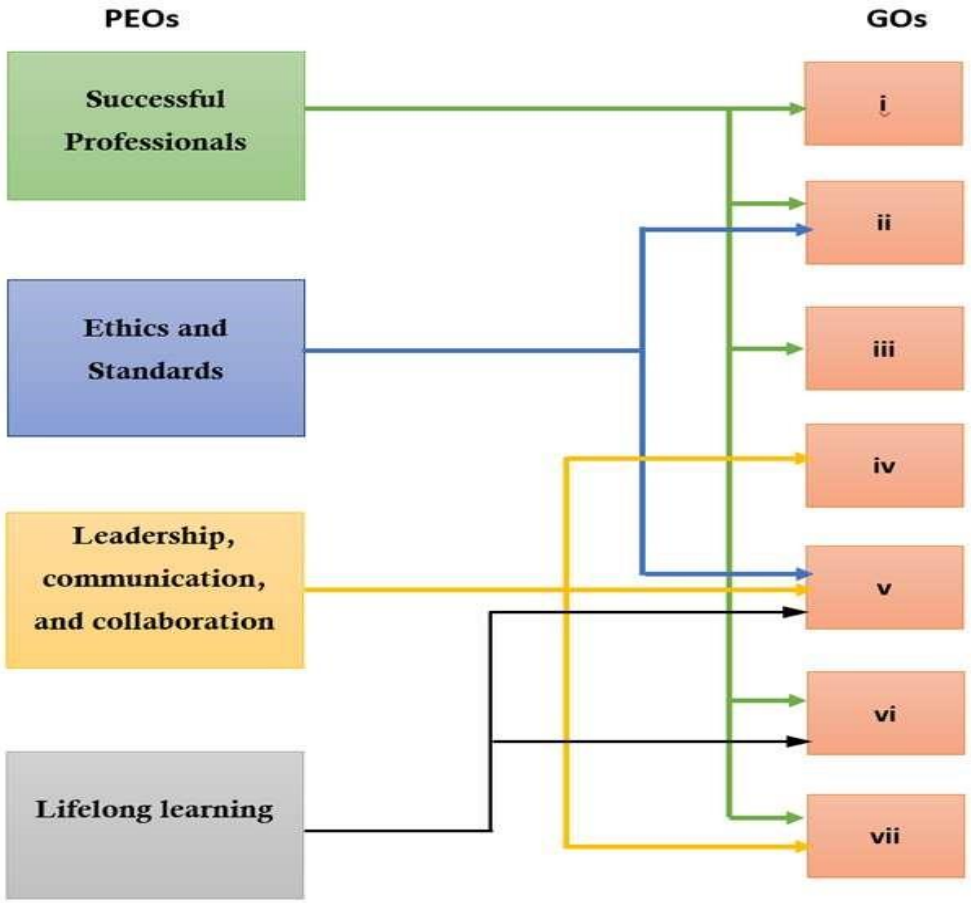

Figure 3.1: Mapping of Program Educational Objectives to Graduate Outcomes

Table 3.3: Mapping between the PEOs and GOs

PEOs	**Graduate Outcomes (GOs)**						
	i	**ii**	**iii**	**iv**	**v**	**vi**	**vii**
PEO-1: Successful Professionals	X	X	X			X	X
PEO-2: Ethics and Standards		X			X		
PEO-3: Leadership, communication, and collaboration				X	X		X
PEO-4: Lifelong learning					X	X	

3.1.3 Attainment of GOs

To certify that the BME graduates achieve the Graduate Outcomes (GOs), the curriculum has to come up with the attainment of each GO collectively. All the GOs are addressed within the core of the curriculum; the BME Department students will be taught and trained to attain the GOs over the coursework. BME courses deal with different courses to teach design, math and science to examine and explanation for engineering problems, lab, and general education. The faculty members are using the problem-based learning technique to achieve GOs. In this technique, the faculty members apply several tools related to GOs such as teamwork, communication (seminars and writing reports), global and environmental aspects, and critical thinking taking into consideration the social and material constraints. Many workshops were held in the BME department to describe the ability to apply the strategy of modern instruction in education and clarify the performance indicators of rubrics for each GO. The syllabi for the required courses describe a correlation of the course to the Graduate Outcomes as presented in Table 3.4.

Table 3.4: Program outcome curriculum map with GOs for the academic year (2024-2025)

First Year (Freshman) – First Semester (Fall Semester)							
Course subjects	**i**	**ii**	**iii**	**iv**	**v**	**vi**	**vii**
Chemistry	**X**						
Mathematics						**X**	
Computer Fundamentals & Programming I	**X**						
Engineering Drawings	**X**						
Biology	**X**						
Electrical Circuits I			**X**				
Human Rights+ Democracy							
First Year (Freshman) – Second Semester (Spring Semester)							
Course subjects	**i**	**ii**	**iii**	**iv**	**v**	**vi**	**vii**

Physics	X						X
Fundamentals of Engineering Mathematics						X	
Computer Fundamentals and Programming II	X						
Engineering Graphics	X	X					
Electrical Circuits II	X		X				
Workshop							

Second Year (Sophomore) – First Semester (Fall Semester)							
Course subjects	**i**	**ii**	**iii**	**iv**	**v**	**vi**	**vii**
Arabic I							
Crimes of Defunct Baath Party							
Academic English I							
Thorax & Limbs Anatomy				X		X	X
Engineering Mathematics	X						
Engineering Mechanics (Statics)	X						
Fundamentals of Electronics	X						
Second Year (Sophomore) – Second Semester (Spring Semester)							
Course subjects	**i**	**ii**	**iii**	**iv**	**V**	**vi**	**vii**
Arabic II							
Analytical Mathematics	X						
Engineering Mechanics (Dynamics)	X		X				
Electronics Circuits	X					X	
Principle of Management							
Abdomen & Head Anatomy				X			
Academic English II							
Introduction to BME				X			X

Third Year (Junior)– First Semester (Fall Semester)							
Course subjects	**i**	**ii**	**iii**	**iv**	**V**	**vi**	**vii**
Engineering Analysis	X						
Mechanics of Materials I	X						
Trunk Anatomy				X		X	X

Physiology I				X		X	X
Histology				X		X	X
Electronics III	X						
Medical Equipment I		X					
Experimental Design			X				
Third Year (Junior)– Second Semester (Spring Semester)							
Course subjects	**i**	**ii**	**iii**	**iv**	**V**	**vi**	**vii**
Engineering Statistics	X		X				
Numerical Analysis	X						
Mechanics of Materials II	X				X		
Head & Neck Anatomy				X			
Physiology II			X			X	
Medical Equipment II					X		X
Bone Injury and Fractures					X	X	

Fourth Year (Junior)– First Semester (Fall Semester)							
Course subjects	**i**	**ii**	**iii**	**iv**	**V**	**vi**	**vii**
English IV							
Biomechanics I	X	X	X	X			
Biomaterials I		X					
Communications		X	X				X
Medical Instrumentation	X						
Digital Electronics I			X				
Thermo-Fluid Mechanics I		X					
Pathology				X		X	X
Fourth Year (Junior)– Second Semester (Spring Semester)							
Course subjects	**i**	**ii**	**iii**	**iv**	**V**	**vi**	**vii**
Biomechanics II	X				X		
Biomaterials II		X					X
Telemedicine							
Analytical Mechanics							
Therapeutic Instrumentation				X			X
Digital Electronics II	X		X				
Thermo-Fluid Mechanics II		X				X	

Image Processing	X		X				

Fifth Year (Senior)– First Semester (Fall Semester)							
Course subjects	**i**	**ii**	**iii**	**iv**	**V**	**vi**	**vii**
Professional Ethics					X		
Project							
Control I	X						
Diagnostic Instrumentation		X					
Hospital System & Design		X					
Microprocessor		X	X				X
Neural Networks	X						
Rehabilitation Engineering		X					
Nanotechnology; Tissue Engineering; 3D Printing		X		X		X	
Fourth Year (Senior)– Second Semester (Spring Semester)							
Course subjects	**i**	**ii**	**iii**	**iv**	**V**	**vi**	**vii**
Engineering Management				X	X		
Project							
Control II	X		X				
Modern Medical Equipment		X			X		
Biotribology	X				X		
Biomedical Sensors		X		X			X
Electromechanical Design		X		X			
Surgery for BME				X			X

3.1.4 Prerequisite Structure

The following chart shows the prerequisite structure of the BME Department curriculum. This path is applied for third to fifth years only. The courses depend on some other courses called pre-requisite courses.

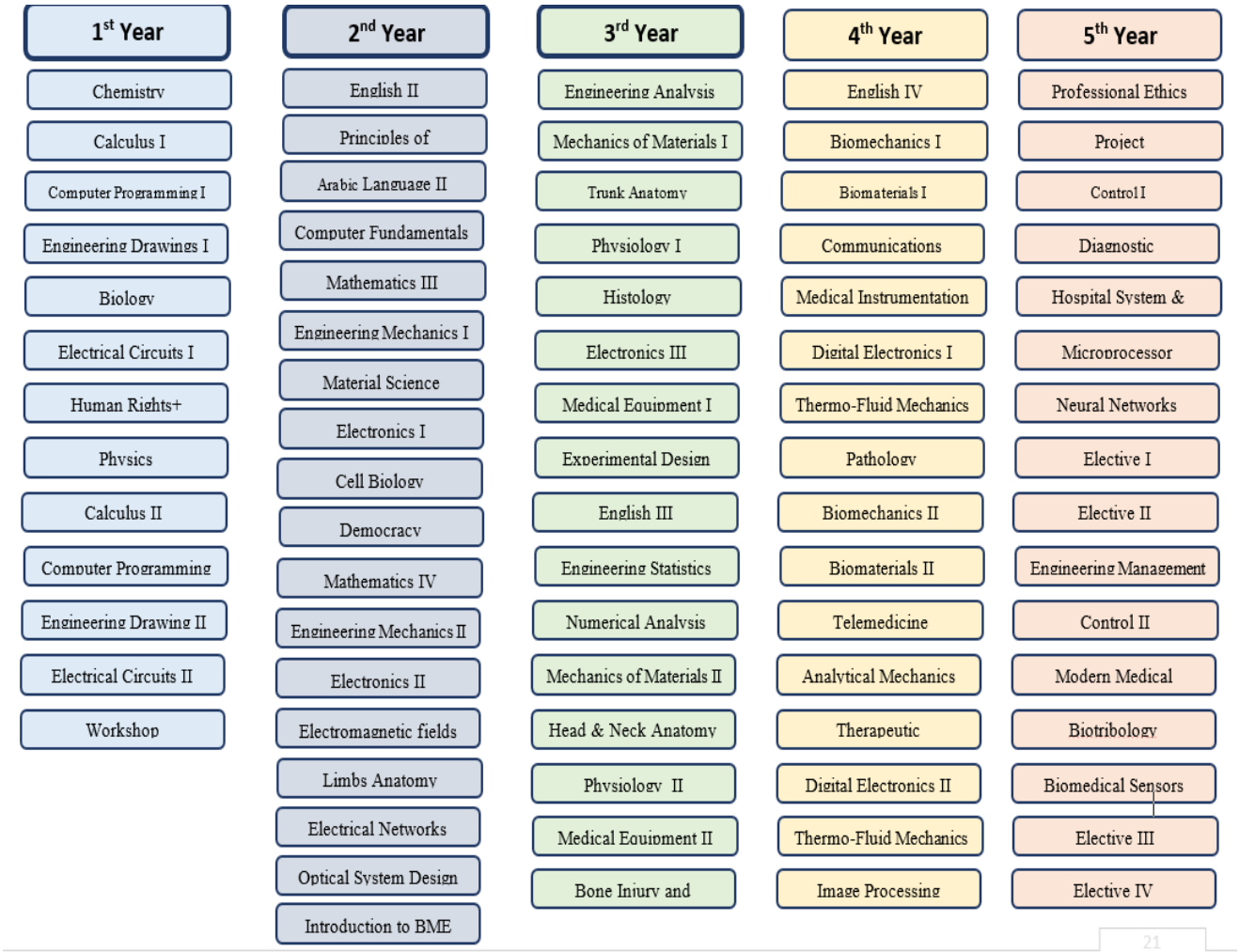

Figure 3.2: Curriculum Structure

Table 3.5: Curriculum Pre-requisites

Course	Depends On
Electrical Circuits II	Electrical Circuits I
Computer Fundamentals and Programming II	Computer Fundamentals and Programming I
Engineering Graphics	Engineering Drawings
Engineering Mechanics I	Physics, Engineering Mathematics
Numerical Analysis	Fundamentals of Engineering Mathematics
Engineering Mechanics II	Engineering Mechanics I
Electronics II	Electronics I
Anatomy II	Anatomy I
Analytic Mathematics	Engineering Mathematics
Engineering Analysis	Numerical Analysis, Analytic Mathematics
Mechanics of Materials I	Engineering Mechanics II
Medical Equipment I	Electronics II

Experimental Design	Experimental Design or Numerical Analysis
Engineering Statistics	Engineering Mathematics or Statistics
Mechanics of Materials II	Mechanics of Materials I
Medical Equipment II	Medical Equipment I
Biomechanics I	Mechanics of Materials II
Biomaterials I	Physiology, Anatomy
Thermo-Fluid Mechanics I	Engineering Mathematics, Physics
Control I	Electronics III, Mathematics
Diagnostic Instrumentation	Medical Equipment II
Project	Completion of 3rd Year Courses
Neural Networks	Mathematics, Programming
Elective I (Rehabilitation Engineering)	Biomechanics
Elective II (Tissue Engineering)	Biomaterials I, Physiology
Elective II (Nanotechnology)	Biomaterials I, Chemistry
Elective II (3D Printing Applications in BME)	Biomechanics, Medical Equipment, Engineering Drawings
Control II	Control I
Biomedical Sensors	Electronics III
Elective III (MEMS)	Microprocessors, Sensors
Elective IV (Surgery for BME)	Anatomy, Medical Equipment

3.1.5 Subject Areas Requirements

Students who complete the Biomedical Engineering program are qualified to work as biomedical engineers in hospitals, healthcare systems, medical device companies, and research institutions. The program is organized across five academic years and is divided into three main categories:

1. **Mathematics and Basic Sciences** – a foundation in biology, chemistry, physics, mathematics, and computer science to support biomedical applications.
2. **Engineering Sciences and Biomedical Design** – covering biomedical instrumentation, biomechanics, biomaterials, electronics, control, and medical equipment systems.

3. **General Education and Professional Studies** – including English language, human rights, ethics, Arabic, and management courses to provide well-rounded knowledge and professional values.

Mathematics and Basic Sciences Topics

The biomedical curriculum builds upon mathematics, chemistry, biology, and physics as essential foundations for medical applications.

- **MATH110 & MATH120 / Mathematics & Fundamentals of Engineering Mathematics**: Introduces calculus, linear algebra, series, polar and Cartesian coordinates, derivatives, and integrals, with biomedical examples.
- **MATH210 & MATH220 / Engineering & Analytic Mathematics**: Covers advanced mathematical tools, including differential equations, vectors, partial derivatives, integrals, and applications in biomechanics and biomedical modelling.
- **PHYS110 / Physics**: Provides knowledge of mechanics, thermodynamics, electricity, and magnetism as applied to biological systems and medical equipment.
- **CHEQ180 / Chemistry**: Introduces atomic structure, molecules, chemical reactions, thermodynamics, and biochemistry fundamentals relevant to medical sciences.
- **BIOL110 / Biology**: Covers cell biology, tissues, genetics, and human systems necessary for biomedical applications.
- **STAT320 / Engineering Statistics**: Applies probability, statistical modelling, estimation, and hypothesis testing to biomedical research and medical data analysis.
- **MDER320 / Numerical Analysis**: Provides computational tools for solving biomedical problems, such as modelling physiological systems.
- **URCOM111 & CREQ121 / Computer Fundamentals and Programming I & II**: Introduces programming logic, algorithms, and software applications with biomedical examples.

Engineering and Biomedical Topics

Graduates gain expertise in designing, developing, and managing medical devices and systems. Core engineering courses are tailored for biomedical applications.

- **Electronics (MDER210, MDER220, MDER315, MDER414, MDER425)**: Covers analog and digital circuits, electronics for medical devices, and digital logic systems.
- **Anatomy & Physiology (MDER213, MDER222, MDER312, MDER313, MDER322, MDER323)**: Provides detailed knowledge of human anatomy and physiology to support biomedical design and clinical applications.
- **Histology & Pathology (MDER314, MDER416)**: Introduces microscopic anatomy of tissues and pathological conditions to relate engineering designs with medical needs.
- **Biomechanics (MDER410, MDER420)**: Applies mechanical principles to biological systems, musculoskeletal analysis, and rehabilitation engineering.
- **Biomaterials (MDER411, MDER421)**: Covers the properties, design, and applications of biomaterials used in implants, prosthetics, and tissue engineering.
- **Medical Equipment & Instrumentation (MDER316, MDER324, MDER413, MDER424, MDER521)**: Introduces design, testing, and implementation of medical equipment, diagnostic devices, and therapeutic instrumentation.
- **Control Systems (MDER510, MDER520)**: Covers control theory and applications in biomedical instrumentation and medical robotics.
- **Signal & Image Processing (MDER427, Neural Networks MDER514, Biomedical Sensors MDER523)**: Introduces biomedical signal analysis, image processing, AI methods, and sensor design.
- **Hospital Systems & Management (MDER512, CREQ520)**: Provides knowledge of healthcare system design, hospital management, and project implementation.
- **Capstone Projects (CREQ510, CREQ521)**: Students complete practical projects integrating knowledge from all fields, focused on solving real-world biomedical engineering problems.

General Education and Humanities

To ensure ethical, social, and professional responsibility, the program also includes:

- **English Language (ENGL230, UREQ320, UREQ410)** – Communication skills in academic and professional contexts.
- **Human Rights & Democracy (URDEM110)** – Awareness of social responsibility and global citizenship.
- **Arabic Language (ARER326)** – Enhancing professional and technical communication in Arabic.
- **Professional Ethics (UREQ510)** – Addresses ethical responsibilities in biomedical practice and research.
- **Principles of Management (MANG210)** – Introduces managerial skills for biomedical project leadership.

3.1.6 Major Design Experience

The Senior Capstone Design course represents the final major design experience in the Biomedical Engineering program. It is designed to integrate knowledge from mathematics, basic sciences, biomedical sciences, and engineering courses into a practical project that simulates real-world biomedical applications. Students apply design principles to define a biomedical problem, propose solutions, and develop a prototype or system, followed by testing, validation, and evaluation.

The main objective of the design experience is to prepare students to address challenges in healthcare technology, medical devices, hospital systems, and rehabilitation engineering. The process emphasizes problem definition, conception, prototyping, verification, and professional reporting. Students are also required to demonstrate teamwork, ethical awareness, and lifelong learning to stay up to date with emerging biomedical technologies. A poster and oral presentation are required at the end of the course.

The design experiences in the Biomedical Engineering program are obtained through the following components:

1. **Engineering Drawing and Graphics (First Year):** Students acquire foundational skills in technical drawing and graphical representation, essential for designing biomedical devices and systems. Topics include orthographic views, sectional views, dimensioning, and assembly diagrams relevant to biomedical components.
2. **Biomedical Equipment and Instrumentation (Third & Fourth Year):** Courses such *as* Medical Equipment I & II, Therapeutic Instrumentation, Diagnostic Instrumentation, and Modern Medical Equipment provide students with direct experience in designing and analyzing biomedical systems including monitoring devices, therapeutic instruments, and diagnostic tools.
3. **Biomechanics and Biomaterials (Fourth Year):** Students gain design experience in applying mechanics to biological systems, prosthetic design, orthopedic devices, and biomaterial selection for implants.
4. **Electronics and Control Systems (Across Years II–V):** Courses in analog and digital electronics, control systems, and microprocessors allow students to design biomedical circuits, sensors, and intelligent medical systems.
5. **Signal and Image Processing (Fifth Year):** Design elements include biomedical signal analysis, medical image processing, and applications of artificial intelligence (e.g., neural networks) for medical decision support.
6. **Capstone Senior Project (Fifth Year):**
    - Conducted in teams of 2–4 students.
    - Projects address real-world biomedical challenges such as prosthetic devices, patient monitoring systems, telemedicine solutions, or hospital system design.
    - Evaluation is based on three components: technical content, presentation quality, and responses to questions.
    - Graduate Outcomes are assessed through a structured rubric.
    - A **Capstone Project Handbook** is available to guide students through project selection, supervision, and evaluation.
    - Students devote approximately six hours per week per semester to their project work.

Finally, Major Design Experience provides Biomedical Engineering students with an industry-like learning environment, where they develop technical, clinical, and professional skills. Students gain their first real-world exposure to working in teams on projects of realistic scale, simulating the role of biomedical engineers in healthcare technology development. This prepares graduates for careers in medical device companies, hospitals, research laboratories, or advanced graduate studies.

3.1.7 Teaching and Learning Strategies

The Biomedical Engineering (BME) program usually includes courses in mathematics, physical sciences, life sciences, as well as engineering, medical instrumentation, and design. The biomedical engineering technology program focuses on both the theoretical foundations and the practical application of engineering principles to medicine and healthcare. Teaching strategies vary from one course subject to another. The traditional form of teaching in the BME program often involves lectures delivered to large groups of students, accompanied by tutorials, laboratory sessions, and workshops, with some independent study.

For the required courses, teaching materials (textbooks, regular course syllabi, course outlines, and list of assignments, etc.), and student work samples of all assignments (homework, quizzes, exams, lab reports, etc.) will be available for review at the time of the visit.

In addition to traditional methods, modern teaching strategies are also applied to enhance student learning outcomes. These include:

- Blended Learning: Integrating online modules, video tutorials, and interactive simulations alongside face-to-face lectures.
- Flipped Classroom: Students review theoretical concepts before class, allowing in-class time to focus on problem-solving and practical applications.
- Project-Based Learning (PBL): Students work on real biomedical engineering projects to apply knowledge and develop critical thinking and creativity.
- Virtual Labs and Simulation Tools: Enabling students to conduct experiments and simulations in a safe digital environment.
- Collaborative and Peer Learning: Encouraging group work and peer instruction to strengthen teamwork, conceptual understanding, and communication skills.
- Formative Assessment and Immediate Feedback: Utilizing online quizzes, interactive polls, and other digital tools to monitor understanding and guide learning.

Digital resources can be powerful learning tools, provided they are used to support known student learning processes and clear learning goals. It is the collaborative and social elements of learning, rather than the depth or flexibility of content often associated with digital resources, which positively impact the learning process. Moreover, collaborative learning can be a powerful strategy in the execution of the Biomedical Engineering program. Group work can help students uncover and address gaps, mistakes, and misconceptions in knowledge, further develop their conceptual frameworks, improve their public reasoning and team-based skills, and free instructors to help students pursue higher-order thinking.

CRITERION 4: CONTINUOUS IMPROVEMENT

A Continuous Improvement is an ongoing process with the purpose of assessing the academic program, improving its components, and making decisions about its future continuity and sustainability.

The BME department at Al-Nahrain University is committed to deliver high quality engineering education. Continuous improvement is essential to maintain and improve the institutional quality. In order to achieve the institutional effectiveness vision, the College of Engineering adopted by Iraqi Council of Accreditation for Engineering Education (ICAEE) criterions for its academic accreditation. The program regularly uses appropriate, documented processes for assessing and evaluating the extent to which the student outcomes are being attained. The results of these evaluations are systematically utilized as input for the continuous improvement of the program. Other available information may also be used to assist in the continuous improvement of the program. Effective assessment uses relevant direct, indirect, quantitative, and qualitative measures as appropriate to the outcome being measured.
Appropriate sampling methods are also used as part of an assessment process.

4.1 Achievement of Graduate outcomes

4.1.1 Assessment Processes

Assessment is one or more processes that identify, collect, and prepare data to evaluate the attainment of student outcomes. Effective assessment uses relevant direct, indirect, quantitative, and qualitative measures as appropriate to the outcome being measured. Appropriate sampling methods may be used as part of an assessment process. Evaluation on the other hand is one or more processes for interpreting the data and evidence accumulated through assessment processes. Evaluation determines the extent to which student outcomes are being attained. Evaluation results in decisions and actions regarding program improvement.

The Bachelor of Science in BME Program employs several tools to assess the achievement of the graduate Outcomes (GOs). The system used to assess the achievement of the student outcomes relies on obtaining feedback from the program constituents using a variety of tools. This system consists of two assessment levels:

1. Course-level assessment
2. Program-level assessment

The elements of the course and program assessment are summarized in Table 4.1 and Table 4.2, respectively.

Table 4.1: Elements of the Course Level Assessment

Course Level Assessment	
Objectives	Assess the achievement of the course learning outcomes (CLOs)
Person in Charge	Course Instructor and Course Coordinator
Coordination	Instructor/Coordinator>>>Assessment Coordinator in Department >>> Chairman/Accreditation Committee >>> Department Council of Faculty Members.
Assessment tools/indicators	Level of achievement of course learning outcomes from instructor point of view. Level of achievement of course learning outcomes from students' point of view. Degree of coverage of course contents from instructor point of view. Relation of individual assessment questions/items to course learning outcomes. Achievement of course learning outcomes based on students' grades on assessment items. Identification of issues of requiring improvement. Proposals for improvements based on assessment results. Students' evaluation of courses and instructors.

Frequency	Every time the course is taught.
Outcome	Course Learning Outcomes Assessment Report.

Table 4.2: Elements of the Program Level Assessment

Program Level Assessment	
Objectives	Assess the achievement of the student outcomes (SOs).
Person in charge	Assessment Coordinator in Department/Accreditation Committee/ Department Chairman
Coordination	Assessment Coordinator in Department Chairman/Accreditation Committee/Department Council of Faculty members
Assessment tools	1. Coverage of program learning outcomes based on course learning outcomes. 2. Achievement of program learning outcomes based on course learning outcomes assessment results. 3. Alumni survey. 4. Employers' survey. 5. Exit survey of graduating students. 6. Feedback from visiting/invited experts (Industry Advisory Board (IAB)), including reports of visiting accreditation teams. 7. Feedback from department advisory board. 8. Students' internship/training survey by employers.

Frequency	Varies from every year (i.e., Exit Surveys) to every few years (i.e., Employer Survey).
Outcome	Assessment Reports as Appropriate

The following sub-sections provide the details of the direct and indirect assessment processes

1. Graduate Outcomes Assessment Based on Direct Assessment

Direct assessment results, based on students' grades on various assessment items, are described in this section. During 2024-2025 the Student Outcomes that were used in the summative assessment were agreed upon by the BME Department Council and Scientific Committee of the BME Department based on (Ajman University, Jordan University of Science and Technology and Khalifa University). During 2021-2024 the Student Outcomes that were used in the summative assessment were agreed upon by the BME Department Council and Scientific Committee of the Department, as presented in Table 4.3. The Performance Indicators had been modified by the Council and Scientific Committee of the BME Department.

Table 4.3: Assessment plan of Graduate Outcomes

Student Outcome	Performance Indicator	Course/ Assessment Tool	Performance Threshold
(i) An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.	Identify the problem key issues/variables	1. MDER220 (Electronics Circuits II) Quiz question 2. PHYS110 (Physics) Quiz question 3. MDER510 (Control I) Quiz question	70%
	Applies appropriate science principles		70%
	Applies appropriate engineering Methods		70%
	Applies appropriate math solution		70%
(ii) An ability to apply the engineering design process to produce solutions that meet specified needs with consideration for public health and safety, and global, cultural, social, environmental, economic,	Identifying requirements	1. CREQ120 (Engineering Graphics) Quiz question 2. MDER426 (Thermo fluid Mechanics II) Quiz question 3. MDER521 ((Modern Medical Equipment) Quiz question	70%
	Developing a design space or conducting trade studies		70%
	Applying design constraints and standards		70%
	Obtaining an effective solution that satisfies requirements		70%

and other factors as appropriate to the discipline.	Consider other sides of design		70%
(iii) An ability to develop and conduct appropriate experimentation, analyse and interpret data, and use engineering judgment to draw conclusions.	Knowledge of approaches	1. ME 2305 (Fluid Mechanics II) Quiz question 2. ME 3307 (Heat transfer II) Quiz question 3. MDER320 (Numerical Analysis) Quiz question	70%
	Knowledge of data collection methods		70%
	Experience		70%
	Ability to analyze and interpret		
	data		70%
(iv) An ability to communicate effectively with a range of audiences.	Writing Skills	1. MDER515 (Tissue Engineering) seminar 2. MDER413 (Medical instrumentation) seminar 3. MDER222 (Abdomen and Head Anatomy) seminar	70%
	Verbal Presentation skills		70%
	Content		70%
	Organization		70%
	Data presentation		70%

(v) An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.	Intellectual property importance	1. CREQ520 (Engineering Management) Quiz question 2. UREQ510 (professional ethics) Quiz question 3. MDER325(Pathology bone injury and fractures) Quiz question	70%
	Consequences of unethical and poor work quality		70%
	Actions to take if others exhibit unethical behavior		70%
(vi) An ability to recognize the ongoing need to acquire new knowledge, to choose appropriate learning strategies, and to apply this knowledge.	Why LLL is important	1. MDER314 (Histology) Quiz question Field (Lab) exercise 2. MDER520 (Control II) Quiz question Field (Lab) exercise 3. MDER220 (Electronics Circuits II) Quiz question Field (Lab) exercise	70%
	Ways to continue learning		70%
	Used modern computer-based tools and techniques		70%
(vii) An ability to function effectively as a member or leader of a team that establishes goals, plans tasks, meets deadlines, and creates a collaborative and inclusive environment.	Constructive participation	1. MDER421 (Biomaterials II) Group Assignment 2. MDER324 (Medical Equipment 2) Group Assignment 3. MDER223 (Introduction to BME) Group Assignment	70%
	Completion of tasks		70%
	Open to other disciplines		70%
	Supports decision process		70%

Note: The assessment results presented in Section 4.2 are not derived from overall exam or course averages. Each exam question, assignment, laboratory task, or seminar presentation was carefully mapped to specific Performance Indicators (PIs) aligned with the Graduate Outcomes (GOs). Attainment levels therefore reflect outcome-based measurement of competencies using rubrics, rather than conventional test grading.

2. Graduate Outcomes Assessment Based on Indirect Methods

The following assessment methods were used for indirect assessment of the graduate outcomes

1- **Achievement of GOs based on students' evaluation of CLOs**. The indicated results are based on a students' survey that is conducted at the end of the semester to determine the level of achievement of course learning outcomes from the students' point of view.

2- **Level of achievement of GOs from the faculty point of view (the Faculty Survey Form).**

3- **Level of achievement of GOs from alumni point of view (the form of Alumni Feedback).**

4- **Level of achievement of GOs from the experts (Industry Advisory Board (IAB)) committee point of view (the form of Experts (Industry Advisory Board (IAB)) Feedback).**

5- **Level of achievement of GOs from Senior Exit Survey (the form of Senior Exit Survey).**

4.1.2 Frequency of Assessment Processes

Currently, the assessments are being carried out every academic year. However, it is expected to carry out the assessments yearly when the resources and the processes are well established in the program.

4.1.3 Expected Levels of Attainment

The Expected Levels of Attainment (Performance Threshold) have been set by the Council and Scientific Committee of the BME Department, as presented in Table 4.3. Specifically, threshold is the expected percentage of students who reach “Meet” or “Exceed", according to the rubrics. Specific levels of threshold have been assigned for the performance indicators for each outcome. These levels were based on the difficulty to achieve each performance indicator. The performance measure can be calculating as the following.

$$\text{Performance Indictor Measurment} = \frac{\text{Number of Students who are Meet or Exceed}}{\textit{Total numer of students}}$$

4.2 Assessment Results, Evaluation, and Actions for Continuous Improvement

4.2.1 Graduate Outcomes Result Analysis Based on Direct Assessment for Biomedical Engineering Department for the Academic Year 2024–2025

This section provides a formal assessment and evaluation of the seven Graduate Outcomes (GOs) for the Biomedical Engineering Program for the 2024–2025 academic year. The analysis is based on quantitative student performance data from designated courses, but importantly, these results are **not conventional exam averages**. Instead, each exam, assignment, laboratory task, or seminar presentation was **mapped to predefined Performance Indicators (PIs)** associated with the Graduate Outcomes (see Table 4.3). The attainment levels reported therefore reflect **specific outcome-based competencies**, not general test scores.

Each PI was systematically evaluated using a detailed rubric to ensure objectivity and consistency. For example, Outcome I (Problem Solving) was assessed through exam and assignment items explicitly mapped to PI-1 (Identify problem variables), PI-2 (Apply science principles), PI-3 (Apply engineering methods), and PI-4 (Apply mathematical solutions). Outcome IV (Communication) was measured through seminar presentations, evaluated with rubrics covering PI-1 (Writing skills), PI-2 (Verbal presentation skills), and related indicators. Outcome VII (Teamwork) was assessed through both instructor evaluation and peer-assessment forms, targeting PIs such as PI-2 (Task completion) and PI-4 (Decision-making support).

The objective of this outcome-based assessment is to identify statistical trends across PIs, highlight strengths and weaknesses in student performance, and translate these findings into **evidence-driven recommendations** for continuous program improvement.

---

1. Assessment and Evaluation of Outcome I: Problem Solving

Outcome I: An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

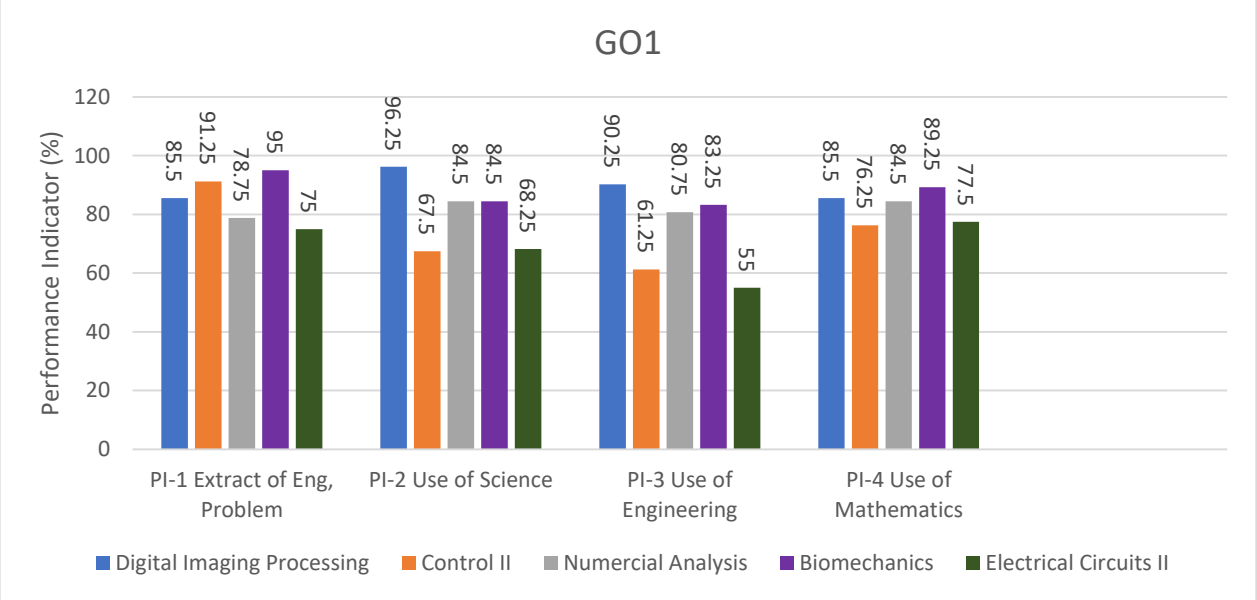

Figure 4.1 Performance indicators measure of Outcome I based on selected subjects in two semesters (2024–2025)

Outcome I is evaluated across five courses (*Digital Imaging Processing, Control II, Numerical Analysis, Biomechanics,* and *Electrical Circuits II*) for four performance indicators. *Biomechanics* consistently scored highest with an average of 88.0%, indicating strong problem-identification skills (PI-1 at 95%). By contrast, *Electrical Circuits II* lagged with an overall average of 68.9%, especially on PI-3 ("Use of Engineering," only 55%). The overall mean for this outcome is approximately 81.0%. Notably, PI-1 ("Extract of Eng, Problem") had the highest average across all courses (85.1%), while PI-3 was the lowest (74.1%).

Trends: A clear trend emerges where students excel at identifying and formulating engineering problems but are weaker in the direct application of core engineering principles to solve them. This gap is most pronounced in courses like *Electrical Circuits II*, suggesting a disconnect between theoretical knowledge and practical application.

Analysis and Recommended Actions: The primary strength within this outcome is the ability to deconstruct and define complex problems. The curriculum for *Biomechanics* should be reviewed as a model of success in this area. The key weakness is the application of engineering principles under PI-3. It is recommended that the curriculum for *Electrical Circuits II* be revised to

incorporate more problem-based learning modules that necessitate the direct application of engineering concepts, mirroring the successful pedagogical approaches observed in *Biomechanics*.

2. Assessment and Evaluation of Outcome II: Engineering Design

Outcome II: An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

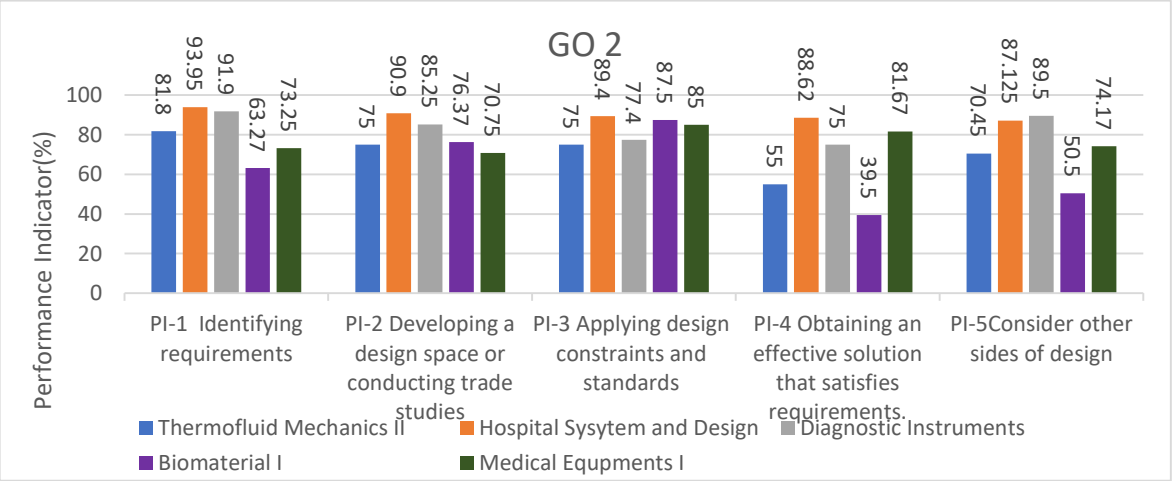

Figure 4.2 Performance indicators measure of Outcome II based on selected subjects in two semesters (2024–2025)

Outcome II is assessed across five courses (*Thermofluid Mechanics II, Hospital System and Design, Diagnostic Instruments, Biomaterial I,* and *Medical Equipment I*) using five performance indicators. The top-performing course was *Hospital System and Design* with a strong average of 90.0%. The most significant area of concern is *Biomaterial I*, which had the lowest average of 63.4%, primarily due to a critically low score of 39.5% on PI-4 ("Obtaining an effective solution"). The overall mean for this outcome is 77.5%. While students scored well on PI-3 ("Applying design constraints and standards") with an average of 82.9%, PI-4 was the weakest area across all courses, averaging only 67.9%.

Trends: The data indicates that students are proficient at understanding and applying established design constraints and standards. However, a systemic weakness exists in translating these theoretical and constrained designs into tangible, effective solutions.

Analysis and Recommended Actions: Students possess a solid theoretical foundation in the design process, but struggle with practical implementation. The deficiency is most urgent in *Biomaterial I*. It is recommended to implement a major, hands-on design project in *Biomaterial I* that requires students to progress from concept to a functional final product. Additionally, introducing case studies of both successful and failed engineering designs can provide critical context and illustrate the path to an effective solution.

3. Assessment and Evaluation of Outcome III: Experimentation and Data Analysis

Outcome III: An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

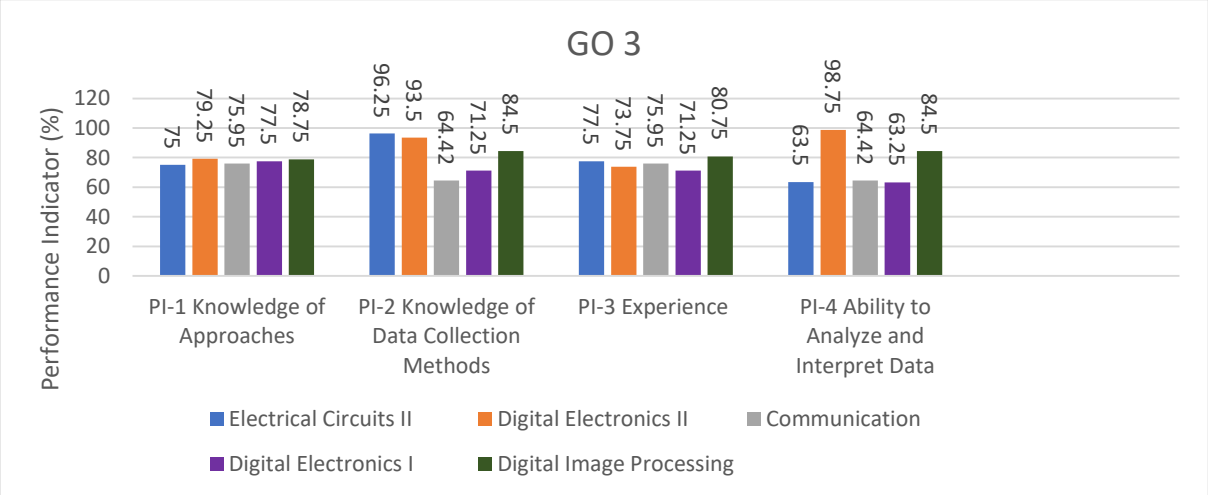

Figure 4.3 Performance indicators measure of Outcome III based on selected subjects in two semesters (2024–2025)

This outcome was evaluated in five courses, including *Electrical Circuits II* and *Digital Electronics II*, based on four PIs. The overall mean for this outcome is 77.9%. *Digital Electronics II* was the highest-performing course at 86.3%, with a near-perfect score of 98.75% in data analysis and interpretation (PI-4). The weakest course was *Digital Electronics I* at 70.8%. Students demonstrated consistent strength in PI-2 ("Knowledge of Data Collection Methods"), which averaged 82.0%. In contrast, performance on PI-4 ("Ability to Analyze and Interpret Data") was highly inconsistent, averaging 74.9% despite the high score in *Digital Electronics II*.

Trends: There is a notable inconsistency in students' data analysis capabilities across the curriculum. While some advanced courses like *Digital Electronics II* show excellence, foundational courses exhibit a clear need for more rigorous training in data interpretation.

Analysis and Recommended Actions: Students have a firm grasp of data collection methods, but their ability to analyze and draw meaningful conclusions from that data is varied. The success of *Digital Electronics II* should be studied and its methods replicated. It is recommended to standardize data analysis modules across all relevant courses and introduce more complex datasets in earlier courses, such as *Digital Electronics I*, to build student confidence and analytical skills progressively.

---

4. Assessment and Evaluation of Outcome IV: Communication

*Outcome IV**:** An ability to communicate effectively with a range of audiences.*

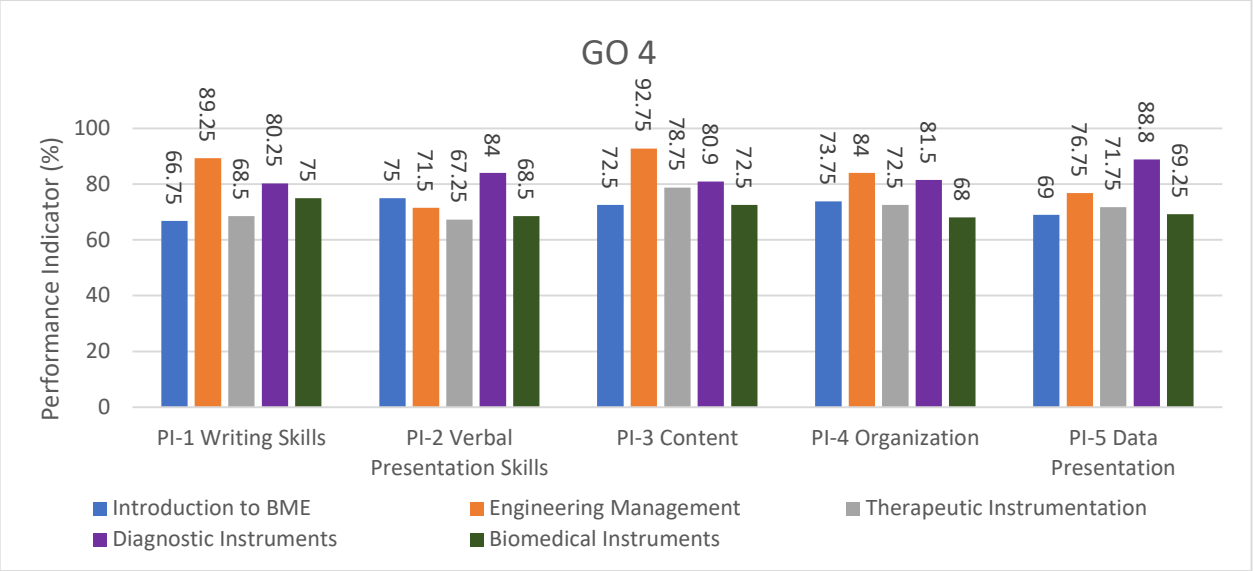

Figure 4.4 Performance indicators measure of Outcome IV based on selected subjects in two semesters (2024–2025)

For the evaluation of this outcome, students presented seminars on various topics within their courses. Their verbal communication skills were specifically assessed based on these presentations, focusing on clarity, delivery, and the effective use of visual aids.

Assessed across five courses, this outcome measures written, verbal, and visual communication skills. The overall average score is 76.5%. *Engineering Management* was the top-performing course with an average of 82.9%, scoring particularly well on PI-3 ("Content") at 92.75%. The weakest performance was in *Biomedical Instruments*, which averaged 70.7%. Overall, students performed best on PI-3 ("Content") with a cross-course average of 79.5%. The lowest-scoring area was PI-2 ("Verbal Presentation Skills"), which averaged 73.3%.

Trends: Students show a strong capability for developing and organizing the substantive content of their communications. However, their ability to effectively deliver that content through oral presentations is a consistent weakness.

Analysis and Recommended Actions: While content development is a strength, the mechanics of delivery, especially verbal skills, require focused improvement. It is recommended to incorporate more graded oral presentation assignments into a wider range of courses. Furthermore, providing

dedicated workshops on public speaking and effective data visualization would directly address the identified weaknesses in PI-2 and PI-5.

5. Assessment and Evaluation of Outcome V: Ethics & Professionalism

Outcome V: An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

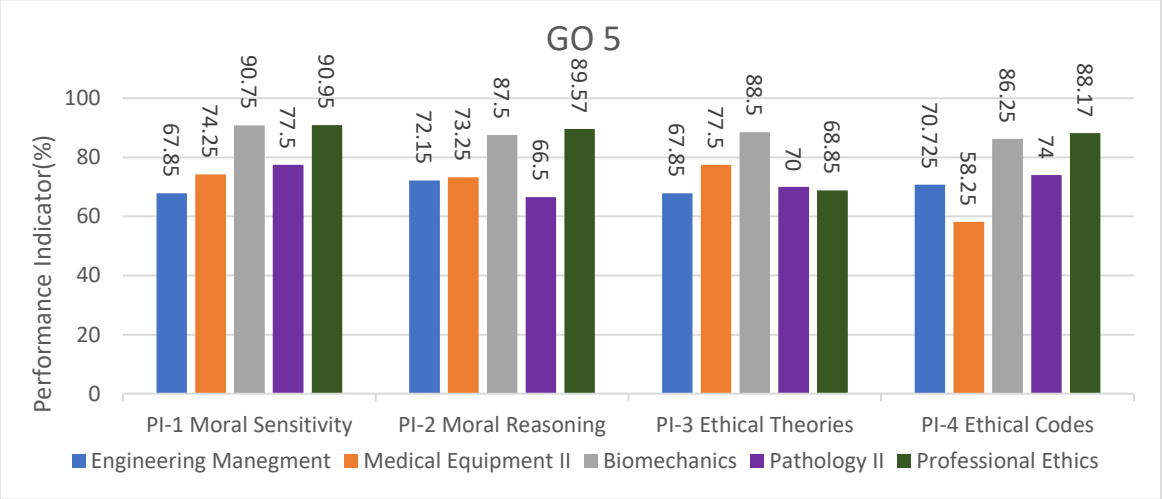

Figure 4.5 Performance indicators measure of Outcome V based on selected subjects in two semesters (2024–2025)

This outcome was measured across five courses using four PIs. The overall average is 77.1%. *Biomechanics* (88.3%) and *Professional Ethics* (84.3%) were the leading courses, while *Engineering Management* was the lowest-performing at 69.6%. The highest-scoring indicator was PI-1 ("Moral Sensitivity") with an average of 80.3%. The weakest area was student understanding of PI-3 ("Ethical Theories"), which averaged 74.5%.

Trends: Students are adept at recognizing potential ethical dilemmas and are familiar with professional codes of conduct. However, they are less proficient in applying formal ethical theories to structure their moral reasoning.

Analysis and Recommended Actions: The dedicated *Professional Ethics* course is effective, but theoretical knowledge is not being consistently applied in other contexts. The primary weakness lies in connecting abstract ethical theories to practical engineering judgments. It is recommended to integrate case studies into more technical courses, requiring students to apply specific ethical theories to resolve complex engineering problems and thereby reinforcing the link between theory and practice.

6. Assessment and Evaluation of Outcome VI: Lifelong Learning

Outcome VI: An ability to recognize the need for, and an ability to engage in, independent life-long learning in the broadest context of technological change.

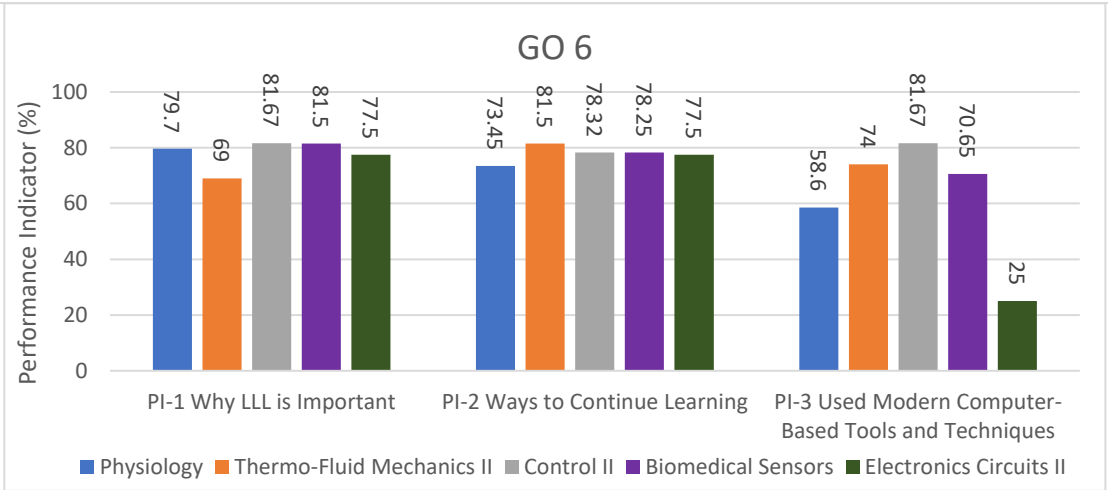

Figure 4.6 Performance indicators measure of Outcome VI based on selected subjects in two semesters (2024–2025)

This outcome is the lowest-performing of all seven, with an overall average of 71.4%. The evaluation is based on three PIs related to understanding the importance of lifelong learning and using modern tools. The weakest performance by a significant margin was in PI-3 ("Used Modern Computer-Based Tools and Techniques"), which averaged only 62.0%. This was driven by an extremely low score of 25% in *Electronics Circuits II*.

Trends: The data reveals a critical gap between students' theoretical appreciation for lifelong learning and their practical ability to use the modern engineering tools essential for it. This deficiency is systemic but is most acute in specific foundational courses.

Analysis and Recommended Actions: This outcome presents the most urgent issue identified in the analysis. The critical deficiency in using modern computer-based tools must be addressed immediately. A curriculum-wide audit of the integration of modern software and computer-based tools is strongly recommended. A major revision of the lab components for *Electronics Circuits II* and other relevant courses is required to incorporate contemporary engineering tools and techniques.

7. Assessment and Evaluation of Outcome VII: Teamwork

Outcome VII: An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

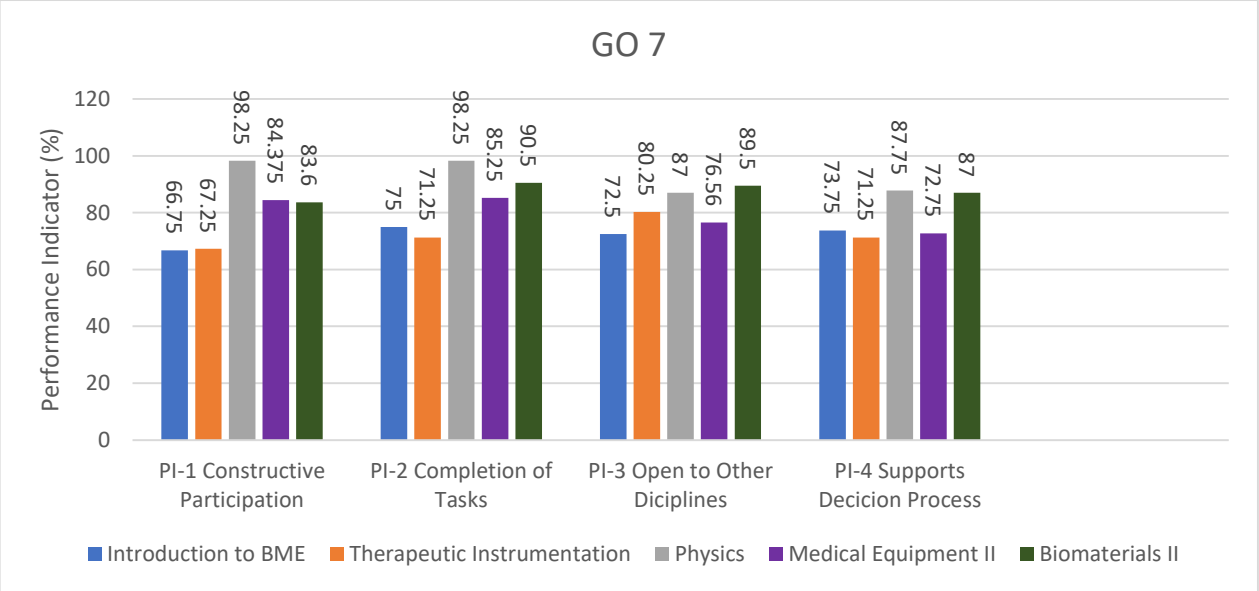

Figure 4.7 Performance indicators measure of Outcome VII based on selected subjects in two semesters (2024–2025)

For the courses included in this outcome, students were divided into groups of 3–5 to complete a designated report or mini-project. The evaluation of teamwork was conducted through a dual-method approach: direct assessment by the course instructor and a peer-evaluation process. For the peer evaluation, a form was distributed to students, allowing each member to assess the contributions of their teammates. It is important to note that the graduating project was not included within the courses for this outcome, as it is undertaken individually by students in the Biomedical Engineering department and not as a group.

Teamwork was assessed in five courses and was a high-performing area, with an overall average of 80.2%. *Physics* was a standout performer, with an exceptionally high average of 92.8%. The strongest indicator across all courses was PI-2 ("Completion of Tasks") at 86.2%, suggesting that student teams are highly effective at meeting their stated goals. The relatively weakest area was PI-4 ("Supports Decision Process") at 75.6%.

Trends: Student teams are highly effective at organizing and completing assigned tasks. The primary area for development is not in task execution but in fostering a more collaborative and inclusive decision-making process within the teams.

Analysis and Recommended Actions: The program is very successful in fostering effective teamwork, and the collaborative environment in the *Physics* course should be considered a model of success. While task completion is a clear strength, there is an opportunity to improve the sophistication of the collaborative process. It is recommended to introduce structured team-building and decision-making exercises in project-based courses to strengthen these supportive skills.

4.2.2 Summary of Evaluations

Table 4.4 below summarizes the assessment results and any changes (whether or not effective) in those cases where the evaluations has been completed.

Table 4.4 Summary of Evaluations across Outcomes

Outcome	Key Focus	Avg Score	Strengths	Weaknesses
I	Problem-solving using science/engineering	81.00%	PI-1 (Identifying & Formulating Problems) at 85.1%	PI-3 (Application of Engineering Principles) at 74.1%
II	Engineering design process	77.50%	PI-3 (Applying Design Constraints) at 82.9%	PI-4 (Obtaining an Effective Solution) at 67.9%
III	Experimentation and analysis	77.90%	PI-2 (Data Collection Methods) at 82.0%	PI-4 (Analyzing & Interpreting Data) shows high inconsistency
IV	Communication skills	76.50%	PI-3 (Content) at 79.5%	PI-2 (Verbal Presentation Skills) at 73.3%
V	Ethics and professional responsibility	77.10%	PI-1 (Moral Sensitivity) at 80.3%	PI-3 (Application of Ethical Theories) at 74.5%
VI	Lifelong learning and modern tools	71.40%	Understanding the importance of lifelong learning	PI3 (Tool usage) ~69.1%
VII	Teamwork and collaboration	80.1%	PI2 (Task completion) ~86.2%	PI4 (Decision support) ~75.6%

4.2.3 General Evaluation and Actions for all Seven Outcomes Based on Direct Assessment

The aim of assessment and evaluation for student outcomes is to develop student learning and to document academic progress. Based on the collected data, the following general evaluation is provided.

Overall, Strengths: Students consistently demonstrate strong abilities in Teamwork (Outcome VII), Problem Solving (Outcome I), and aspects of Experimentation & Data Analysis (Outcome III). These areas reflect robust foundational and collaborative skills. Curricula in courses like *Physics*, *Biomechanics*, and *Hospital System Design* are highly effective and should be seen as models for success.

Overall, Areas for Improvement: The most significant weakness across the entire program is in Lifelong Learning (Outcome VI), specifically related to the use of modern, computer-based engineering tools. This requires urgent attention. Following this, Engineering Design (Outcome II) needs improvement, as students struggle to translate theoretical designs into effective solutions. Verbal communication skills within Communication (Outcome IV) also present a clear area for development.

General Actions: The department should prioritize a curriculum-wide audit and enhancement of modern engineering tool integration to address the critical deficiencies in Outcome VI. A renewed focus on project-based learning is needed to bridge the design-to-solution gap in Outcome II. Concurrently, it is crucial to maintain and further strengthen the effective practices in teamwork and problem-solving that are already yielding high performance, leveraging the successes of standout courses across the program.

4.2.4 Graduate Outcomes Results Analysis Based on Indirect Assessment

The achievement percentage for each GO is presented in this section. The results are obtained from the indirect measures of the achievement of the GOs based on the various assessment survey forms in the course. The assessment was carried out by the following forms Senior Exit (SE), faculties (F), Experts (E)/ (Industry Advisory Board (IAB)), and alumni (A).

On 5th of May 2025, the meeting (questionnaire) for the SE form was held in the presence of the Dean of engineering college, Head of the Department, Chairman of the Academic Accreditation Committee and some faculty members. The results shown in Figure 4.11 are the summary of the student meeting. Most of the students' comments were positive in terms of the program in general, as well as the teaching staff and curricula, but there are observations that must be taken into consideration, which are summarized as follows:

1- The practical side is very important and the laboratories need more care in terms of maintenance of devices and the accuracy of their work because some lab devices are old.
2- Increasing the number of examples within the lecture which helps to understand the scientific material better.
3- Working on developing computer laboratories which helps the student to design and analyze more easily.
4- The building is kind of old and a new building is required.
5- Internet access is a necessary issue for most students.
6- A new technology for teaching is needed for example providing a data show projector in each classroom.
7- The curriculum of English classes should include engineering terminology.

Regarding the Industry Advisory Board (IAB) questionnaire, some were sent electronically while others received it in printed form. Their feedback was collected simultaneously to enable the interpretation and analysis of the results, as outlined below in Figure 4.10.

The values of the level of achievement for each GO from indirect assessment are as shown in Figures 4.8 - 4.11. The results of the direct measures are based on the results of the performance indicators assessment for each GO as presented below.

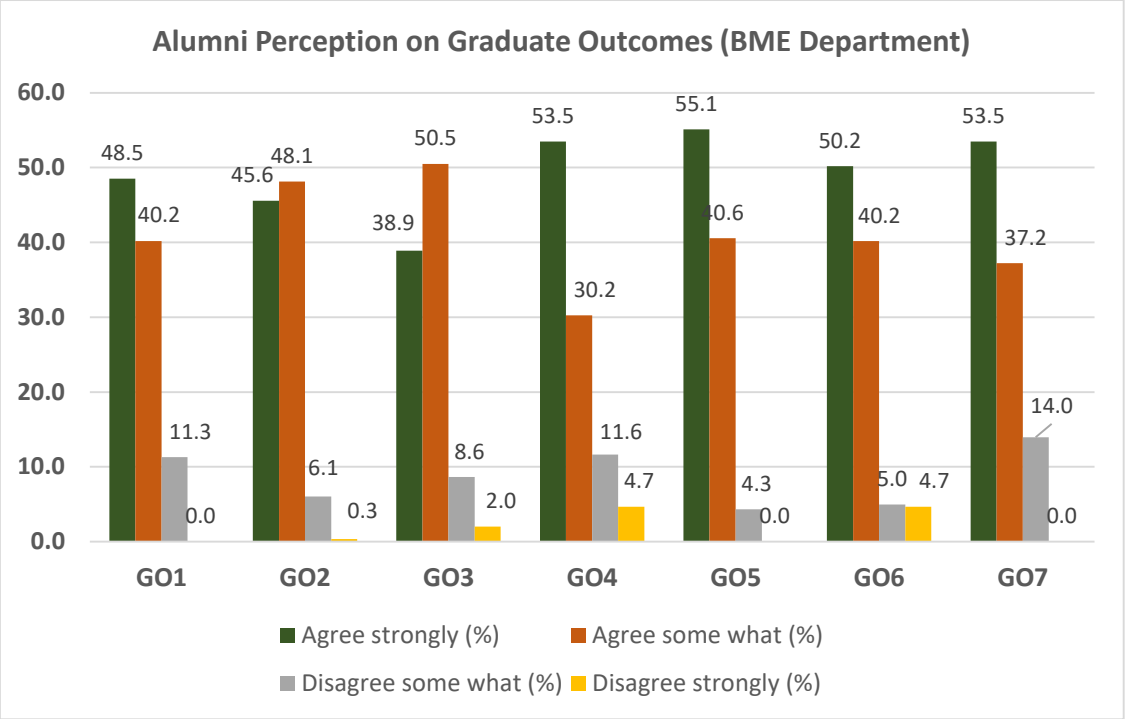

Figure 4.8 Achievement of GOs Based indirect assessment methods (A= Alumni feedback) in 2024-2025

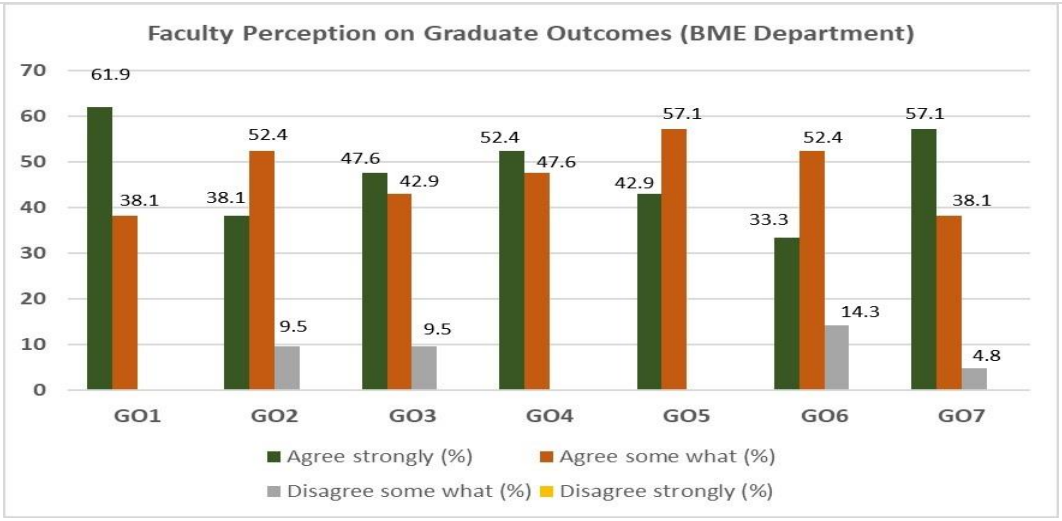

Figure 4.9 Achievement of GOs Based indirect assessment methods (F= Faculty survey) in 2024-2025

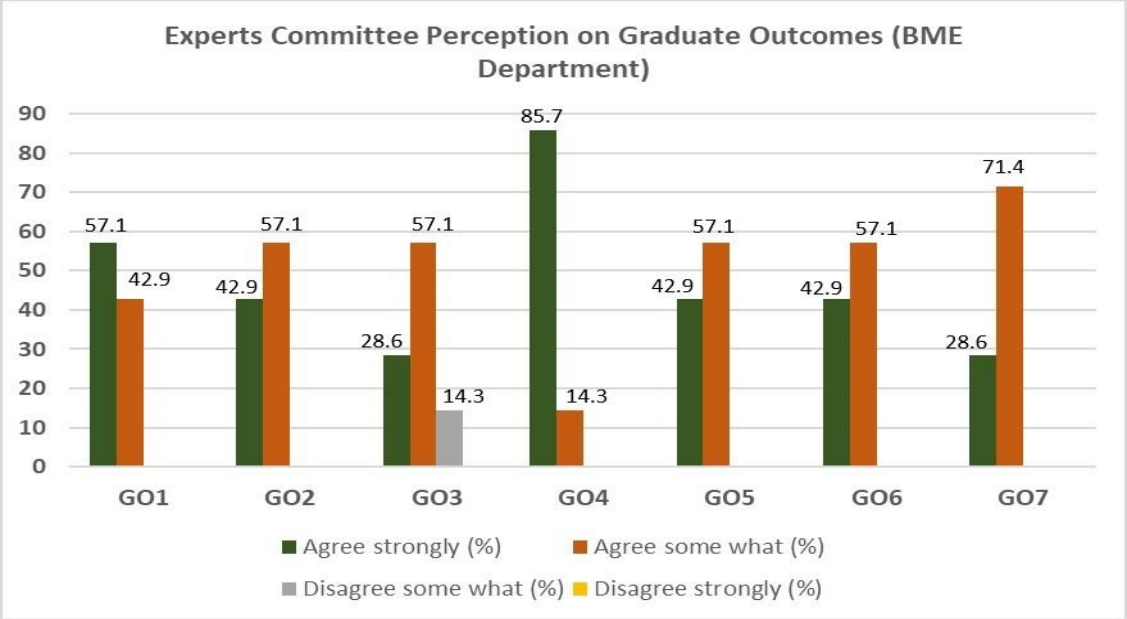

Figure 4.10 Achievement of GOs Based indirect assessment methods (E= Experts= Industry Advisory Board (IAB)) in 2024-2025

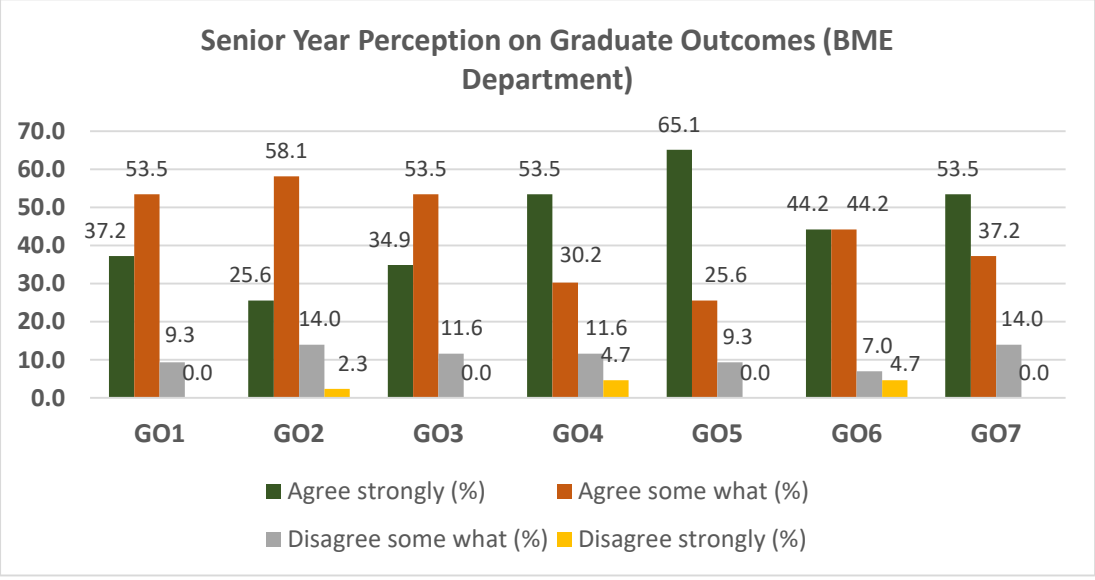

Figure 4.11 Achievement of GOs Based indirect assessment methods (SE= Senior Exit) in

4.2.5 Assessment of the Graduate Outcomes Survey for Alumni of the Department of Biomedical Engineering

This section presents a comprehensive analysis of the self-assessment survey conducted among alumni of the Department of Biomedical Engineering. This feedback provides valuable insight into the long-term impact and effectiveness of the program by capturing the perceptions of graduates who have transitioned into professional environments. The survey gauges alumni perceptions regarding their attainment of seven distinct graduate outcomes (GO1-GO7), with responses categorized by their level of agreement (as shown in Figure 2.8).

Discussion of Alumni Assessment Results

The data reveals a strong positive perception among alumni regarding their achievement of the specified graduate outcomes, suggesting that the program provides a durable and effective foundation for their careers. The level of strong agreement is consistently high across most outcomes, with total agreement (combining "Agree Strongly" and "Agree Somewhat") exceeding 85% for every outcome.

Outcome GO5 received the most positive feedback, with approximately 55% of alumni selecting "Agree Strongly," indicating a very high degree of conviction in their proficiency. Conversely, GO3 shows the lowest level of strong confidence, though overall agreement remains high. The most significant level of disagreement was noted for GO7, which may indicate an area for further review.

Detailed Analysis by Graduate Outcome

GO1:

- Agree Strongly: 48%
- Agree Somewhat: 40%
- Disagree Somewhat: 11%
- Disagree Strongly: 0%

A total of 88% of alumni feel they have achieved this outcome. The high percentage of strong agreement indicates that graduates feel well-prepared in this area long after graduation.

GO2:

- Agree Strongly: 45%
- Agree Somewhat: 48%
- Disagree Somewhat: 6%
- Disagree Strongly: 0%

With 93% of alumni in agreement, this outcome is perceived as a success. The large "Agree Somewhat" contingent suggests a solid, functional competency is achieved.

GO3:

- Agree Strongly: 39%
- Agree Somewhat: 50%
- Disagree Somewhat: 9%
- Disagree Strongly: 0%

While a strong majority (89%) express a positive perception, this outcome has the lowest "Agree Strongly" percentage. This suggests that while alumni feel competent, they may perceive their expertise in this specific area as less profound compared to others.

GO4:

- Agree Strongly: 53%
- Agree Somewhat: 30%
- Disagree Somewhat: 12%
- Disagree Strongly: 5%

A combined 83% of alumni agree they have met this outcome, with over half agreeing strongly. However, the total disagreement of 17% is the highest across all outcomes and warrants further investigation.

GO5:

- Agree Strongly: 55%
- Agree Somewhat: 40%
- Disagree Somewhat: 4%
- Disagree Strongly: 0%

This outcome represents a significant area of program strength according to alumni. A commanding 95% of graduates feel confident in this area, with the highest level of strong agreement, suggesting the curriculum is highly effective in this domain.

GO6:

- Agree Strongly: 50%
- Agree Somewhat: 40%
- Disagree Somewhat: 5%
- Disagree Strongly: 5%

A total of 90% of alumni agree they have met this outcome. The strong majority and balanced split between "Agree Strongly" and "Agree Somewhat" indicate widespread and lasting proficiency.

GO7:

- Agree Strongly: 53%
- Agree Somewhat: 37%
- Disagree Somewhat: 14%
- Disagree Strongly: 0%

A high level of agreement (90%) is observed here. However, the 14% who "Disagree Somewhat" is notable, suggesting that while the majority feel well-served, a specific minority of graduates may have felt underprepared in this area.

Indications

The consistently high agreement rates, particularly for outcomes like GO5, GO2, and GO6, suggest that the program's core curriculum and learning experiences are successful in preparing students for their careers. The confidence shown by alumni in GO5, in particular, points to a clear and lasting strength of the program.

The results for GO3, while positive, indicate an opportunity to deepen student expertise. The disagreement percentages for GO4 and GO7, although representing a minority, are high enough to merit attention.

Recommendations

Based on this alumni self-assessment:

1. **Reinforce Strengths:** Identify the pedagogical methods and curriculum components contributing to the success of GO5. Leverage these successful strategies as a model for other outcomes where strong confidence is lower (e.g., GO3).
2. **Investigate Areas of Disagreement:** Prioritize a review of the curriculum related to GO4 and GO7. Explore the reasons for the higher disagreement rates through targeted qualitative feedback from alumni, perhaps via follow-up surveys or focus groups.
3. **Cross-Reference with Student Data:** Compare these alumni findings with the senior exit survey data. A comparative analysis can reveal whether student perceptions at graduation align with alumni perceptions post-graduation, highlighting how well preparedness translates into real-world application.

4.2.6 Assessment of the Graduate Outcomes Survey for Faculty Members of the Department of Biomedical Engineering

This section presents an analysis of a survey conducted among faculty members in the Department of Biomedical Engineering, assessing their perceptions of various graduate outcomes. The survey captures the level of agreement among faculty regarding the attainment of these outcomes by students (as shown in Figure 2.9).

Outcome I: An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.

- **Statistics:** For Outcome I (GO1), 61.9% of faculty members "Agree strongly" that students possess this ability, while 38.1% "Agree somewhat". No faculty members disagreed with this outcome.
- **Indications:** These results indicate a strong consensus among faculty regarding students' proficiency in identifying, formulating, and solving engineering problems using fundamental principles. The high percentage of "Agree strongly" suggests a very positive outlook on this outcome.
- **Recommendations:** Continue to foster strong foundational knowledge in engineering, science, and mathematics across the curriculum.

Outcome II: An ability to apply the engineering design process to produce solutions that meet specified needs with consideration for public health and safety, and global, cultural, social, environmental, economic, and other factors as appropriate to the discipline.

- **Statistics:** Regarding Outcome II (GO2), 38.1% of faculty "Agree strongly" and 52.4% "Agree somewhat". A small percentage, 9.5%, "Disagree somewhat" with this outcome. (Refer to Figure 1 for visual representation of these percentages).
- **Indications:** While a majority of faculty agree with students' ability in applying the engineering design process, the presence of some disagreement suggests there might be areas where this skill could be further strengthened.
- **Recommendations:** Explore opportunities to enhance hands-on design projects and activities within courses to solidify students' application of the engineering design process, particularly concerning constraints and solution realization.

Outcome III: An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

- **Statistics:** For Outcome III (GO3), 47.6% of faculty "Agree strongly" and 42.9% "Agree somewhat". Similar to Outcome II, 9.5% of faculty "Disagree somewhat". (Refer to Figure 1 for visual representation of these percentages).

- **Indications:** The results show strong agreement from faculty on students' abilities in experimentation, data analysis, and drawing conclusions. The minor disagreement points to potential subtle gaps that could be addressed.
- **Recommendations:** Maintain robust laboratory experiences and data analysis exercises. Consider incorporating more emphasis on critical interpretation of experimental results to strengthen judgment skills.

Outcome IV: An ability to communicate effectively with a range of audiences.

- **Statistics:** For Outcome IV (GO4), 52.4% of faculty members "Agree strongly" that students can communicate effectively, and 47.6% "Agree somewhat". No faculty members expressed any disagreement. (Refer to Figure 1 for visual representation of these percentages).
- **Indications:** These findings highlight a very positive perception among faculty regarding students' communication skills. The collective agreement indicates a strong performance in this area.
- **Recommendations:** Continue to provide diverse opportunities for students to present their work through various mediums and to different audiences.

Outcome V: An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

- **Statistics:** In terms of Outcome V (GO5), 42.9% of faculty "Agree strongly" and 57.1% "Agree somewhat". There was no disagreement reported for this outcome. (Refer to Figure 1 for visual representation of these percentages).
- **Indications:** Faculty members largely believe that students are proficient in recognizing ethical and professional responsibilities. The absence of disagreement suggests a consistent understanding of this outcome's achievement.
- **Recommendations:** Integrate ethics discussions and case studies more broadly into technical courses to further embed ethical considerations within practical engineering contexts.

Outcome VI: An ability to recognize the ongoing need to acquire new knowledge, to choose appropriate learning strategies, and to apply this knowledge.

- **Statistics:** For Outcome VI (GO6), 33.3% of faculty "Agree strongly" and 52.4% "Agree somewhat". A notable 14.3% of faculty "Disagree somewhat" with this outcome. (Refer to Figure 1 for visual representation of these percentages).
- **Indications:** While the majority of faculty agree with students' lifelong learning abilities, the highest percentage of "Disagree somewhat" among all outcomes suggests this is an area that could benefit from targeted improvement.
- **Recommendations:** Encourage the use of modern tools and online learning platforms to promote continuous knowledge acquisition. Incorporate discussions on career-long learning plans to enhance students' understanding of various learning strategies.

Outcome VII: An ability to function effectively as a member or leader of a team that establishes goals, plans task, meets deadlines, and creates a collaborative and inclusive environment.

- **Statistics:** Regarding Outcome VII (GO7), 57.1% of faculty "Agree strongly" and 38.1% "Agree somewhat". Only 4.8% of faculty "Disagree somewhat" with this outcome. (Refer to Figure 1 for visual representation of these percentages).
- **Indications:** These results demonstrate a strong faculty perception of students' ability to work effectively in teams. The very low percentage of disagreement suggests that teamwork is a well-developed skill among graduates.
- **Recommendations:** Maintain and enhance opportunities for team-based projects and collaborative learning experiences to further refine leadership and decision-making skills within groups.

Overall Conclusion

The faculty survey results reveal a generally strong and positive perception of graduate outcomes among the Department of Biomedical Engineering faculty. Outcomes related to problem-solving (Outcome I), communication (Outcome IV), and teamwork (Outcome VII) show the highest levels of strong agreement, indicating these are perceived as significant strengths. While there is still majority agreement for outcomes related to engineering design (Outcome II), experimentation (Outcome III), ethics (Outcome V), and lifelong learning (Outcome VI), a small percentage of disagreement, particularly for Outcome VI, suggests these areas could benefit from focused efforts to further enhance student capabilities. The survey provides valuable insights into faculty perceptions, which can be used to inform curriculum development and teaching strategies to ensure comprehensive student development across all graduate outcomes.

4.2.7Assessment of the Graduate Outcomes Survey for Experts Committee in the Department of Biomedical Engineering

This report presents an analysis of a survey conducted among the members of the Experts Committee in the Department of Biomedical Engineering, assessing their perceptions of various graduate outcomes. The survey captures the level of agreement among experts regarding the extent to which students achieve these outcomes (as shown in Figure 10).

Outcome I: An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.

- **Statistics:**
    - Agree strongly: 57.14%
    - Agree somewhat: 42.86%
    - Disagree somewhat: 0.00%
    - Disagree strongly: 0.00%
- **Indications:** These results indicate a strong consensus among experts regarding students' proficiency in identifying, formulating, and solving engineering problems

using fundamental principles. The high percentage of "Agree strongly" suggests a very positive outlook on this outcome.

- **Recommendations:** Continue to foster strong foundational knowledge in engineering, science, and mathematics across the curriculum.

Outcome II: An ability to apply the engineering design process to produce solutions that meet specified needs with consideration for public health and safety, and global, cultural, social, environmental, economic, and other factors as appropriate to the discipline.

- **Statistics:**
    - Agree strongly: 42.86%
    - Agree somewhat: 57.14%
    - Disagree somewhat: 0.00%
    - Disagree strongly: 0.00%
- **Indications:** Experts almost unanimously agree that students are capable of applying the engineering design process. However, there is a shift towards "Agree somewhat" compared to "Agree strongly," which might indicate a need to deepen the practical application of these skills with consideration for various factors.

- **Recommendations:** Integrate more comprehensive design projects that require students to consider a wider range of factors (public health and safety, environmental, economic, etc.) in their engineering solutions.

Outcome III: An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

- **Statistics:**
    - Agree strongly: 28.57%
    - Agree somewhat: 57.14%
    - Disagree somewhat: 14.29%
    - Disagree strongly: 0.00%

- **Indications:** While the majority of experts agree with this outcome, a notable percentage (approximately 14%) expresses some disagreement. This suggests there is room for improvement in students' abilities to conduct experiments, analyze data, and draw conclusions using engineering judgment.
- **Recommendations:** Enhance hands-on laboratory experiences and research opportunities that require students to design their own experiments, analyze complex datasets, and develop their engineering judgment skills.

Outcome IV: An ability to communicate effectively with a range of audiences.

- **Statistics:**
    - Agree strongly: 85.71%
    - Agree somewhat: 14.29%
    - Disagree somewhat: 0.00%
    - Disagree strongly: 0.00%
- **Indications:** These results demonstrate a strong perception among experts of students' effective communication skills. The very high percentage of "Agree strongly" indicates that this is considered a key strength of the graduates.
- **Recommendations:** Maintain and enhance opportunities for students to present their work, both orally and in writing, to diverse audiences (including both technical and non-technical) to further refine their communication skills.

Outcome V: An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

- **Statistics:**
    - Agree strongly: 42.86%
    - Agree somewhat: 57.14%
    - Disagree somewhat: 0.00%

- Disagree strongly: 0.00%

- **Indications:** Almost all experts agree that students recognize ethical and professional responsibilities. However, the significant concentration on "Agree somewhat" suggests that while students are aware of these responsibilities, they may need further support in applying them to make informed judgments in complex contexts.
- **Recommendations:** Integrate more complex case studies and real-world scenarios that require students to analyze ethical dilemmas, consider global and societal impacts, and make informed engineering decisions.

Outcome VI: An ability to recognize the continuing need for new knowledge, to choose appropriate learning strategies, and to apply this knowledge.

- **Statistics:**
    - Agree strongly: 14.29%
    - Agree somewhat: 42.86%
    - Disagree somewhat: 28.57%
    - Disagree strongly: 14.29%
- **Indications:** This outcome shows the highest level of disagreement among experts, with only 42.86% agreeing strongly or somewhat. This indicates a significant area for improvement regarding students' ability to recognize the need for lifelong learning, choose effective learning strategies, and apply new knowledge.
- **Recommendations:** Strengthen the emphasis on lifelong learning within the curriculum. Provide workshops on effective learning strategies, encourage students to explore independent learning methodologies, and incorporate examples of ongoing advancements in the biomedical engineering field.

Outcome VII: An ability to work effectively as a member or leader of a team that establishes goals, plans task, meets deadlines, and creates a collaborative and inclusive environment.

- **Statistics:**
    - Agree strongly: 57.14%
    - Agree somewhat: 42.86%
    - Disagree somewhat: 0.00%
    - Disagree strongly: 0.00%

- **Indications:** These results demonstrate a strong perception by experts of students' ability to work effectively in teams. The high percentage of "Agree strongly" suggests that teamwork is considered a well-developed skill among graduates.
- **Recommendations:** Maintain and enhance opportunities for team-based projects and collaborative learning experiences to further refine leadership and decision-making skills within groups.

Overall Conclusion

The results of the expert survey reveal a generally strong and positive perception of graduate outcomes among the Experts Committee members in the Department of Biomedical Engineering. Outcomes related to problem-solving (Outcome I), communication (Outcome IV), and teamwork (Outcome VII) show the highest levels of strong agreement, indicating these are perceived as significant strengths.

While there is still majority agreement for outcomes related to engineering design (Outcome II), experimentation (Outcome III), ethics (Outcome V), and lifelong learning (Outcome VI), a small percentage of disagreement, particularly for Outcome VI, suggests these areas could benefit from focused efforts to further enhance student capabilities. The survey provides valuable insights into expert perceptions, which can be used to inform curriculum development and teaching strategies to ensure comprehensive student development across all graduate outcomes.

4.2.8 Assessment of the Graduate Outcomes Survey for Senior Exit of the Department of Biomedical Engineering

This section presents a comprehensive analysis of the self-assessment survey conducted among senior-year students in the Department of Biomedical Engineering. The survey captures student perceptions regarding their attainment of seven distinct graduate outcomes (GO1-GO7), with responses categorized by their level of agreement (as shown in Figure 11).

Discussion of Student Self-Assessment Results

The data reveals a generally positive perception among students regarding their achievement of the specified graduate outcomes. However, the level of confidence varies significantly across the different outcomes. Overall, the results highlight areas of curricular strength as well as opportunities for targeted improvement.

Outcome GO5 received the most positive feedback, with 65% of students selecting "Agree Strongly," indicating a high degree of conviction in their proficiency. Conversely, GO2 shows the lowest confidence, with only 25% agreeing strongly and the highest combined percentage of disagreement.

Detailed Analysis by Graduate Outcome

GO1:

- Agree Strongly: 37%
- Agree Somewhat: 53%
- Disagree Somewhat: 9%
- Disagree Strongly: 1%

A total of 90% of students feel they have achieved this outcome to some extent. The high "Agree Somewhat" percentage suggests a solid foundation, though there may be an opportunity to increase students' level of confidence from proficient to expert.

GO2:

- Agree Strongly: 25%
- Agree Somewhat: 58%
- Disagree Somewhat: 14%
- Disagree Strongly: 3%

While a majority (83%) agree they have met this outcome, it has the lowest "Agree Strongly" percentage and the highest total disagreement at 17%. This indicates that GO2 is a key area where students feel least prepared.

GO3:

- Agree Strongly: 35%
- Agree Somewhat: 53%
- Disagree Somewhat: 11%
- Disagree Strongly: 1%

Similar to GO1, a strong majority of students (88%) express a positive perception. The large "Agree Somewhat" group suggests general competency, but a lower level of strong confidence.

GO4:

- Agree Strongly: 53%
- Agree Somewhat: 30%
- Disagree Somewhat: 12%
- Disagree Strongly: 5%

A combined 83% of students agree they have met this outcome. The high "Agree Strongly" percentage is a positive indicator, though the 17% disagreement is notable and warrants further investigation.

GO5:

- Agree Strongly: 65%
- Agree Somewhat: 25%
- Disagree Somewhat: 9%
- Disagree Strongly: 1%

This outcome represents a significant area of strength. A commanding 90% of students feel confident, with nearly two-thirds of all respondents agreeing strongly. This suggests the curriculum is highly effective in this domain.

GO6:

- Agree Strongly: 44%
- Agree Somewhat: 44%
- Disagree Somewhat: 7%
- Disagree Strongly: 5%

A strong total of 88% of students agree they have met this outcome. The balanced split between "Agree Strongly" and "Agree Somewhat" indicates widespread proficiency.

GO7:

- Agree Strongly: 53%
- Agree Somewhat: 37%
- Disagree Somewhat: 14%
- Disagree Strongly: 0%

A high level of agreement (90%) is observed here, with over half of the students feeling strongly confident. However, the 14% who "Disagree Somewhat" is the highest of any category, suggesting a specific minority of students may feel left behind in this area.

Indications

The strong majority in agreement for outcomes like GO5, GO1, and GO7 suggests that the related curriculum and learning experiences are largely successful. The high confidence in GO5, in particular, points to a clear strength in the program.

The results for GO2, and to a lesser extent GO4, highlight potential areas for review. The combination of low strong agreement and high disagreement for GO2 suggests a need to re-evaluate how this outcome is being taught and assessed. The "Disagree Somewhat" responses for GO7 also indicate a need for targeted support.

Recommendations

Based on this student self-assessment:

- Reinforce Strengths: Identify and continue the pedagogical methods and course components contributing to the success of GO5. Use this as a model for other outcomes.
- Address Gaps: Prioritize an investigation into the curriculum related to GO2. The reasons for the low confidence and higher disagreement should be explored through focus groups or targeted qualitative feedback.
- Targeted Support: For GO7 and GO4, investigate why a notable percentage of students disagree with their attainment. Consider offering supplemental workshops or resources to bridge this gap.
- Qualitative Data Collection: To gain deeper insights across all outcomes, follow up with open-ended questions in future surveys to understand *why* students feel the way they do and what specific learning experiences contributed to their perception.

This analysis provides valuable, student-centric insight that can be used to complement faculty assessments and drive continuous improvement in the curriculum and student support services.

4.2.9 Action Plan to Enhance Graduate Outcomes Based on the Assessment Report of Senior Exit Survey

Following the review of the "Senior Year Perception on Graduate Outcomes" survey, the Scientific Committee has developed this direct, three-stage action plan. The objective is to translate the survey data into targeted program improvements. The focus is on addressing student concerns regarding GO2, GO4, and GO7, while leveraging the clear success of GO5 as a model for excellence.

Stage 1: Investigation and Analysis (Timeline: Approx. 6 Weeks)

The immediate priority is to understand the root causes of the survey results.

1. **Present Core Findings:** Present a summary of the assessment report to the BME faculty to ensure departmental alignment and begin a collaborative dialogue.
2. **Lead Curriculum Mapping:** Facilitate a faculty-wide curriculum mapping exercise to visually identify where each graduate outcome is taught, reinforced, and assessed, pinpointing potential gaps.
3. **Gather Direct Student Feedback:** Conduct focus groups with students and recent alumni to gather qualitative insights into their learning experiences, focusing on the specific challenges and successes related to the key outcomes.

Stage 2: Strategic Intervention and Implementation (Timeline: Ongoing through the next academic year)

Based on the findings, develop and oversee the execution of a formal improvement strategy.

1. **Develop a Targeted Action Plan:** Synthesize all evidence to draft an action plan proposing specific and measurable interventions. This will include recommendations for curricular modifications, new teaching strategies, and enhanced student support.
2. **Secure Faculty Approval:** Present the complete action plan to the faculty for discussion, refinement, and formal approval.
3. **Monitor Implementation:** The committee will actively monitor the implementation of all approved changes, offering support to faculty and course coordinators to ensure the plan is executed effectively.

Stage 3: Evaluation and Continuous Improvement (Timeline: End of next academic year)

To ensure the interventions are effective, close the loop with a final evaluation.

1. **Re-assess Student Outcomes:** Re-administer the Graduate Outcomes Survey to the next cohort of senior students.

2. **Analyze and Report Impact:** Conduct a comparative analysis of the new data against the baseline report. The results, measuring the impact of the interventions, will be shared with the entire department.
3. **Iterate for the Future:** This data-driven cycle of analysis, action, and evaluation will serve as an ongoing model for continuous program improvement.

4.3 Course Assessment by Student (CAS)

At the end of each semester, there is an indirect assessment in which the course learning outcomes (CLOs) for each subject are evaluated by the students by sending a specific form. The evaluation is conducted confidentially and under the direct supervision of the department head. The course instructor will be informed about the results of this evaluation.

4.4 Additional Information

Copies of any assessment materials and additional documentations will be available electronically and printed at the visit time. Other information, such as minutes from meetings from the BME committees where the assessment results were evaluated and where recommendations for action were made, will also be included.

4.5 Continuous Improvement Procedures

In addition to the systematic assessment and evaluation processes described in Sections 4.1 and 4.2, the Biomedical Engineering Department has established **formal procedures for continuous improvement**. These procedures ensure that measurement results are not only collected but also translated into actionable strategies, re-assessment, and long-term planning.

4.5.1 From Measurement to Action

- **Data Review**: Assessment results from direct and indirect measures (tests, surveys, alumni/employer feedback, Industry Advisory Board input) are reviewed annually by the Accreditation Committee and Department Council.
- **Gap Identification**: Key areas of weakness (e.g., low performance in Outcome VI – Lifelong Learning, or Outcome II – Engineering Design) are highlighted.
- **Improvement Plans**: For each weakness, the department develops a targeted action plan (e.g., revising Electronics Circuits II laboratory to integrate modern tools; introducing project-based design assignments in Biomaterials I).

4.5.2 Implementation of Improvements

- **Curriculum Enhancements**: Revised syllabi and lab manuals are introduced, incorporating recommendations from assessment findings.
- **Faculty Development**: Workshops on modern teaching strategies, project-based learning, and ethical decision-making are organized.
- **Learning Resources**: Investment in upgraded laboratories, digital tools, and teaching aids is prioritized where student/alumni feedback shows deficiencies.

4.5.3 Re-assessment and Closing the Loop

- After implementation, the department **re-administers assessments and surveys** to verify whether changes have produced measurable improvements.
- For example, after modifications in Biomechanics and Hospital System Design, subsequent evaluations showed improved attainment levels in Outcomes I and II.
- Results are documented in updated performance indicator reports and compared against baseline data to confirm effectiveness.

4.5.4 Future Planning and Drivers of Change

- **Strategic Future Plans**: Continuous improvement is aligned with the College of Engineering strategic plan and ICAEE accreditation standards.
- **Drivers of Change**: Changes are motivated by data trends (e.g., weak tool usage in GO6), stakeholder expectations (employer feedback on graduate readiness), and evolving biomedical engineering practices.
- **Forward-Looking Actions**: Plans include expanding the use of simulation software, adopting hybrid/online modules, and enhancing industry partnerships for student projects.

Table 4.5: Comprehensive Action Plan for Continuous Improvement (GO1–GO7)

Graduate Outcome (GO) & Identified Weakness	Action/Improvement Implemented	Responsible Party	Timeline	Re-assessment Method & Result	Documentation / Evidence
GO I – Problem Solving: Weak in applying engineering principles (PI-3 only 55% in Electrical Circuits II).	Revise Electrical Circuits II curriculum with problem-based learning modules; add real-world case studies.	Course Instructor, Curriculum Committee	2025–2026	Quizzes & assignments (target ≥75% in PI-3).	Revised syllabus, faculty meeting minutes, PI reports.
GO II – Engineering Design: Weak in "Obtaining effective solutions" (Biomaterials I, PI-4 avg. 39.5%).	Introduced project-based design assignment requiring concept → prototype; integrate design case studies.	Course Instructor, Department Council	2025–2026	Course assessment & student feedback (expected +10% in PI-4).	Revised syllabus, course reports, design rubrics.

GO III – Experimentation & Data Analysis: Inconsistent ability to analyze/interpret data (Digital Electronics I only 70.8%).	Standardize data analysis modules across labs; introduce advanced datasets earlier.	Lab Coordinators, Accreditation Committee	2025–2026	Lab-based assessment & student projects (target ≥80% in PI-4).	Lab manuals, assessment reports, minutes.
GO IV – Communication: Weak verbal presentation skills (PI-2 avg. 73.3%).	Add mandatory oral presentations in multiple courses; organize public-speaking workshops.	QA Officer, Course Coordinators	Ongoing (from 2025–2026)	Rubric-based seminar evaluation (target ≥80% in PI-2).	Workshop reports, rubrics, seminar forms.
GO V – Ethics & Professionalism: Weak application of ethical theories (PI-3 only 74.5%).	Embed ethical case studies in technical courses; integrate professional codes across curriculum.	Ethics Instructor, Curriculum Committee	2025–2027	Case-based assessments (target ≥80%).	Revised syllabi, assessment samples, committee notes.
GO VI – Lifelong Learning: Very low tool usage (Electronics II lab PI-3 only 25%).	Upgrade labs with modern tools/software (SPICE, MATLAB, CAD); add mandatory training modules.	Lab Coordinator, Department Chair	Semester 1, 2025–2026	Lab reports & surveys (target ≥70%).	Procurement docs, updated lab manuals, surveys.
GO VII – Teamwork: Weak in "Supporting	Introduced structured peer evaluation & decision-making exercises in project courses.	Instructors, Accreditation Committee	2025–2026	Peer evaluations & project reports	Peer-eval forms, project reports, committee records.

decision-making" (PI-4 at 75.6%).				(target ≥85%).	
General Student/Alumni Feedback: Outdated labs, poor internet, lack of projectors.	Lab maintenance, new equipment, improved Wi-Fi, projectors in classrooms.	Department Council, College Admin	2025–2027	Student satisfaction surveys (target ≥90% positive).	Meeting minutes, procurement docs, feedback reports.

The implementation of these improvement procedures, followed by systematic re-assessment and documentation, ensures that the department not only measures performance but also acts upon it. The following section (4.6) presents future-oriented planning that further strengthens the continuous improvement cycle.

4.6 Future Plans for Continuous Improvement

To sustain accreditation standards and strengthen the Biomedical Engineering program, the department has developed forward-looking strategies that ensure continuous improvement remains dynamic and aligned with future challenges. These plans build on the lessons learned from assessment and improvement cycles (Sections 4.1–4.5) and reflect the department's strategic vision.

4.6.1 Curriculum and Pedagogy

- **Integration of Modern Tools**: Expand the use of advanced biomedical software (MATLAB, CAD, COMSOL, SPSS, AI-based analysis tools) across all core courses.

- **Case-Based and Project-Based Learning**: Increase the number of capstone-style projects and real-world case studies to improve design, teamwork, and ethical decision-making skills.
- **Interdisciplinary Modules**: Introduce new electives linking biomedical engineering with data science, AI, and clinical innovation.

4.6.2 Assessment and Evaluation

- **Expanded Stakeholder Feedback**: Broaden employer and alumni surveys to include international partners and industry collaborators.
- **Digital Dashboards**: Develop an electronic tracking system to monitor Graduate Outcomes (GO1–GO7) attainment in real time.
- **Longitudinal Studies**: Conduct alumni tracer studies every three years to evaluate the long-term impact of program learning outcomes.

4.6.3 Faculty and Student Development

- **Faculty Capacity-Building**: Organize annual workshops on outcome-based education (OBE), modern pedagogy, and assessment methods.
- **Student Skills Training**: Launch workshops in communication, innovation, leadership, and entrepreneurship to address recurring weaknesses in GOs.
- **Research Engagement**: Encourage undergraduate involvement in faculty-led research projects to enhance problem-solving and lifelong learning.

4.6.4 Infrastructure and Resources

- **Laboratory Modernization**: Continue upgrading labs with simulation, imaging, and diagnostic equipment aligned with global standards.
- **Learning Environment**: Expand access to high-speed internet, e-learning platforms, and hybrid teaching spaces.

- **Resource Allocation**: Develop a five-year facilities improvement plan linked to student surveys and advisory board feedback.

4.6.5 Documentation and Accreditation Sustainability

- **Institutional Memory**: Standardize templates for action plans, follow-up reports, and meeting minutes to ensure continuity across accreditation cycles.
- **Benchmarking**: Compare the program against top regional and international biomedical engineering departments to identify best practices.
- **Accreditation Renewal Preparation**: Maintain readiness for periodic ICAEE accreditation reviews by keeping assessment and improvement cycles fully documented.

These future plans confirm that the department is committed not only to addressing current weaknesses but also to anticipating future needs in biomedical engineering education. The systematic alignment of **assessment, improvement, re-assessment, and forward planning** ensures that the program continues to evolve and meet both national accreditation standards and international best practices.

CRITERION 5: STUDENTS

5.1 Student Admission

5.1.1 Procedures for student admission and registration in the college

First: The admission of the student to the college and specifying the scientific department are to be centralized by the Ministry of Higher Education and Scientific Research - Directorate of Studies, Planning and Follow-up - Central Admission. This is for all admission channels (central - 10% first over Iraqi institutes - 5% first on technical education - holders of an equivalent degrees) and according to what qualifies, the attained average and the student's desire to choose the college and department mentioned in the application form through the electronic portal of the Directorate of Studies, Planning and Follow-up based on the admission plan sent by the college, specifies the number of students who can be accepted in each scientific department.

Second: Accepted student in the college must register electronically using a prepared registration form of new students by the presidency of the university - Department of Registration and Student Affairs in order to, record his personal information in the 'My University system' to obtain university identification number of all students admitted to Al-Nahrain University and then create an electronic account for each student, the student also will be provided with a password to enter the university electronic systems.

Third: The student must come to the new student reception committee formed in the college within a two-week period from the date of announcing the results of the central admission in Iraqi universities for the purpose of completing the personal file for admission to the college, handing over the required certificates and personal documents, medical examination, registration fees, and also conducting a personal interview to verify the student's physical and health qualifications according to the university valid instructions, completing the form for

obtaining university identity and submission of a written commitment to preserve the college's property and to apply all instructions and laws that must be followed during the study period.

Fourth: The college issues administrative orders for enrolled students in the college and informs the scientific departments therein, the student must start attendance within a period of two weeks from the date of issuance of the administrative order, otherwise considered failed due to absence for the current academic year, according to item-9 of the examination instructions, 134 of the year 2000 issued by the Ministry of Higher Education and Scientific Research.

5.1.2 Conditions for student admission to the college

a) All nationality.

b) Must hold the Iraqi secondary study certificate for one of the two branches (biological or applied) or a certificate equivalent to it, supported by the approval of the General Directorate of Education in the province.

c) Must be successful in the medical examination, according to the applicable health-fitness conditions based on the valid Health Fitness Regulation No. 5 of 1992.

d) Full-time study, it is not permissible to combine study and job.

e) Must be graduated of the current or previous academic year that did not have central admission or any other admission.

f) The age of the applicant to study at the college must not be more than (24) years old.

5.2 Student Performance and Progress

5.2.1 The academic system, the length of study in the college and the permitted years of wastage

1. The academic system followed in the college, is the semester system consisting of two semesters. Each academic term lasting 15 weeks. All of these done in the morning study

since there is evening study, but there is no part-time study or even parallel education in an engineering college.

2. The duration of study in the BME is five years.
3. For the student to succeed to a higher stage of study, he/she is to succeed in the academic subjects of the stage, or they may fail in two academic subjects. In this case, he/she is considered successful by crossing to a higher stage. The student must succeed with the transit courses in the following academic year. In the case of failure, his/her enrollment in the college is permanently written off.
4. The student has the right to amend his/her candidacy for admission to another department/ college in the event that he/she does not wish to complete the study in the BME deprtment, provided that he/she is deferred or failed in the current academic year. The deferred or failed academic year, is not counted within the time limit allowed for the student.
5. The student may postpone his/her studies for one year after presenting reasons that are convincing by the College Council. The President of the University, based on the recommendation of the College Council, may postpone the student's study for a second year. The Minister of Higher Education and Scientific Research or whoever authorizes him and based on the recommendation of the University Council and for legitimate reasons that he/she is convinced to postpone the student's study for a third academic year, provided that the student submits a request for postponement in all cases before (30) thirty days at least from the start of the final exam.
6. A student may fail two years in the college, provided that they are not consecutive.

5.2.2 Instructions and regulations that the student must adhere to during the study

First: Examination Instructions 134 for the year 2000 and their amendments, the most important of which are:

a) clause (6): The minimum passing score that the student must obtain in order to succeed in any academic subject is (50%) fifty percent.

b) Clause (9): A student is considered to have failed in any academic course if his/her absence exceeds 10% of the hours prescribed for that course without a legitimate excuse and 15% with a legitimate excuse approved by the College Council.

c) Clause (12): A student has no right to postpone the second attempt of final exams in any way.

d) Clause (19): A student's relationship with the college ends in one of the following two cases:

1. If he/she fails two consecutive years in his/her class.
2. If the student exceeds the total period prescribed for study in his/her major and half of this period (i.e., six years) and the years of postponement and non-failure are not counted as part of that.

e) Clause (20): If it is proven that the student cheated or attempted to cheat in any of the daily, weekly, monthly, quarterly, or final exams, he/she shall be considered as failing in all courses for that year, and if this is repeated, he/she shall be dismissed from the faculty and permanently closing his/her records.

Second: Instructions for student discipline in the institutions of the Ministry of Higher Education and Scientific Research No. 160 of year 2007 amended, the most important of which are:

a) The student shall abide by the internal laws and regulations, instructions and orders issued by the Ministry of Higher Education and Scientific Research and the University.

b) Not to prejudice religious beliefs, national unity, or national sentiments by bad or intentionally provoking sectarian or ethnic strife, by word or deed.

c) Not to harm the reputation of the ministry or its institutions by word or deed, inside and outside it.

d) Avoiding everything that is inconsistent with university behavior, with high discipline and respect for the administration, faculty and staff, collegial relations and cooperation with students.

e) Preserving the academic supplies and the university and college property.

f) Adherence to the uniform prescribed for students by the university.

Students who fail or were not able to attend the final examination are allowed to take a second attempt exam. If the student fails to get 50% in the last attempt, he/she will be considered as (FAIL) in that course. The student is allowed to transfer/load two failed courses to the next year level, but if he/she failed in more than two courses, the student must repeat the academic year.

Fail to succeed in two successive years, the student will be dismissed from the university.

5.3 Students Transfer

5.3.1 Transfer and scientific set-off standards

First: - Transfer procedures

1. Transfer procedures must start from the student's original college exclusively. The letter of non-objection to the student's transfer from the mother college to the corresponding one should provide the study materials that the student passed and the number of courses credit units are attached for the purpose of conducting the scientific set-off. All procedures should be done electronically using the website prepared by the Ministry of Higher Education and Scientific Research.
2. Only successful students (from the first stage to the second and from the second stage to the third) are entitled to transfer.
3. The transfer order for the student from his/her original college is issued after the issuance of a letter of no-objection for the transfer from the college to which he/she wants to transfer to. It is not permissible to register the student in the college to be transferred till the transfer order and his/her going away from the original college are issued.
4. Top students in the departments (Physics, Life Physics and Applied Sciences) are entitled to transfer to the college and be accepted into the electrical engineering department and exclusively through the Ministry of Higher Education and Scientific Research.

5. Students returning to Iraq, who continue to study in the morning shift outside Iraq and studying in one of the recognized universities have the right to transfer to the college provided that their pass rate of students is within the minimum limits for admission to the college and must be through the ministry exclusively.
6. Faculty members' sons/daughters are entitled to transfer to universities in the governorate of their residence in the academic year in which they are admitted, provided that the difference in their pass rate does not exceed the minimum for admission to the college by only (5) five degrees.

Second: Scientific Set-Off

A scientific set-off/clearing is intended to make a comparison between the academic courses that the student studied in the original college and in the college to be transferred to. It is the specialty of the scientific committee formed in the department exclusively according to the following:

1. Admission of the student to the same academic stage. If the academic courses are identical between the two colleges (transferred to and from) or differ in one or two courses with the fact that the academic system is identical.
2. If the difference in academic courses between the two colleges is more than two methodological courses, then the student has the choice between getting back him/her to a lower stage of study or cancelling his/his transfer to the college, in the event that he/she chooses to transfer to a lower stage of study, the academic year is not counted within the total time limit allowed for the student.
3. The subjects (human rights, democracy, computer, Arabic language, English language) are not included in the scientific clearing account and the student will be demanded to them during his/her study years.

5.4 Students Advising and Extracurricular Activities

Typically, students spend only 30% of their waking hours inside of the college classroom, students have several options for spending their out-of-classroom time. Students involved in extracurricular activities report developing higher confidence, intimacy, mature interpersonal relationships, and purpose.

Extracurricular activities offer students valuable opportunities to connect with peers, explore interests, and contribute to campus and community life. However, with numerous choices available and mounting pressure to succeed, it's easy for students to become overwhelmed by commitments outside the classroom, potentially compromising their academic success.

The necessary organizational procedures were put in place to meet the students through holding meetings under the supervision of the educational supervisors in the scientific department and all the information for the purpose of guidance and educational guidance as follows:

- The advising units at the College of Engineering contact the department and provide file for the new students.
- At the department level, there is an advising committee which distributes the students among faculty staff.
- The advisers meet the student on regular basis and on demand to monitor his/her progress, solve any problems the student is facing, and advise him/her in any curricular/ extracurricular matters.
- All these procedures are well documented and reserved at the department.

Table 5.1 summarized the types of advising committee, the aims and the acting of achieving the aims in ME department.

Table 5.1: The Types of advising committee

Advising type	Aims	Actions
Academic	The academic advising process is integrated with the awareness and understanding of all parties to the advising process. With the aim of directing the student to the most appropriate ways to choose the best ways in order to achieve the desired success and adapt to the university environment.	Achieved through awareness lectures and periodic meetings with students.

psychologically	The university student may face many academic and life situations and problems that may affect his psyche and his academic and social performance, and their secretions may be reflected clearly on his personality and the vocabulary of his dealings with others, and this makes him in constant and continuous need for advice, guidance and guidance from others who are older and more experienced and mature within the university.	It takes place through individual meetings with students who suffer from psychological and family problems.
Occupation	It is represented by the practical side of the student with regard to the laboratories that are dealt with in the different stages of study.	This is done by holding a meeting with the students and guiding them with occupational safety instructions before entering the laboratories and engineering workshop.

5.5 Graduation Requirements

The requirements for graduation from the college and the mechanism for calculating the overall average and round of the graduation student:

First: Graduation requirements

1. For the student to graduate from the college, the student must pass all the academic subjects that are the requirements of the college and the scientific department. The evaluation process and assessment measures may be summarized as shown in Table 5.2.

Table 5.2: The course evaluation process

Course Type	Progress Exam-1	Progress Exam-2	Activities	Lab	Final Exam	Final Grade
Lab. Courses	**10%**	**10%**	**5**	**15%**	**60%**	**100%**

Medical Lab. Courses	**15%**	**15%**	**10%**	**10%**	**50%**	**100%**
Regular Courses	**15%**	**15%**	**10%**	**-**	**60%**	**100%**
Bologna track	**10%**	**10%**	**10%**	**10%**	**50%**	**100%**

One exception to this is the Capstone project where the course work is going to be 40% and the dissertation viva will be 60%.

2. Completion of summer training (summer training means practical application in actual fields of work in government, public, and private sectors that the student practices in order to live part of the practical life of his/her scientific specialization).
3. The student's acquittal from the property of the university, college, and scientific department.

Second: The mechanism for calculating the student's graduation rate and the attempt he/she graduated from

1. The overall college graduation average is calculated by multiplying the student's rate in each academic year by the percentage indicated against that, the total academic years is the overall average of the student's graduation.
   - The first academic year (5%) is five percent.
   - The second academic year (10%) is ten percent.
   - The third academic year (15%) is fifty percent.
   - The fourth academic year (30%) is thirty percent.
   - The fifth academic year (40%) is forty percent.

2. The number of attempts that the student has completed depends on the graduation requirements to determine the attempt of graduation from the college (first or second). Therefore, the student is considered a graduate of the second round in the event that he/she passes the scientific clearing materials or transit materials in the second attempt even if he/she has successfully passed the courses of the final stage of the first attempt.

CRITERION 6: FACULTY

6.1 Faculty Qualification

The credentials and experience of the faculty are presented in Table 6.1, and detailed faculty resumes are included in Appendix C. As shown in Table 6.1, the faculty members hold international credentials and have gained industry and academic experience through their work with both the private sector and universities. They have also participated in training and qualification programs for new graduates from the Ministry of Higher Education and Scientific Research/ Department of Human Development, with reference number T.M.7/ 12590 on 10/31/2024. They also participated in the training program titled "Mechanism for Applying Iraqi Standards for the Quality of Educational Laboratories with the Guidance Manual," with reference number H.N/2/1/1185 on 4/9/2025.

Detailed qualifications of the faculty members can be found in the following Al-Nahrain university website:

https://cv.nahrainuniv.edu.iq/?l=ar&lock=&lname=&qualification=0&stitle=0&collegeid=2&depid=11

The faculty members teach courses, conduct research in their specialty areas, and mentor and supervise students at both undergraduate and graduate levels of the offered programs. The faculty specialization and expertise cover the following Engineering disciplines:

1. Biomedical Engineering
2. Biomechanics
3. Electronics and Communication
4. Material science and Biomaterials
5. Medical sciences

In Biomedical Engineering, the BME Department has 15 permanent faculty members. The faculty professional and research experience in this area span from bio-instrumentation systems design, control, signal and image processing. Also, the faculty in this area provides expertise in hospital design and management, and rehabilitation engineering.

In Biomechanics, the BME Department has 3 permanent faculty members. The faculty professional and research experience in this area span from gait analysis, Fluid mechanics, rehabilitation, prosthetics and orthotic system design.

In Material science and Biomaterials, the BME Department has 3 permanent faculty members. The faculty professional and research experience in these areas span from applications of new composite material, Nanocomposite materials and structures, behavior of metallic and nonmetallic materials under static and dynamic conditions.

In Electronics and Communication, the BME Department has 7 permanent faculty members. The faculty professional and research experience in these areas span from applications of signal processing to wireless body area networks and embedded diagnostic equipment.

In medical sciences, the BME Department has 4 permanent faculty members with strong clinical and biological expertise. The faculty professional and research experience in this area span from human physiology, pathophysiology, and clinical medicine to molecular biology, pharmacology, and translational research. This foundational knowledge is crucial for designing effective medical devices, understanding disease mechanisms, and developing targeted therapies.

Credentials and experience of the faculty are presented in Table 6.1 and detailed faculty resumes are included in Appendix C. As shown in Table 6.1, the faculty members hold international credentials and have gained industry and academic experience through their work with both private sector and universities. In addition, they hold active licenses and registration with professional organizations.

Table 6.1: Faculty Qualifications

Faculty Member Name	Highest Degree Earned, Field and Year	Scientific Rank1	Type of Academic Appointment PS Or TS	FT or PT	Year of Experience			Year of Experience Govt./Ind. Practice	Level of Activity H, M, Or L		
					Govt./Ind. Practice	Teaching	This Institution		Professional Organizations	Professional Development	Consulting/Work in Industry
Dr. Auns Qusai Hashim Al-Neami	**Ph.D**	**ASP**	**PS**	**FT**	**19**	**19**	**19**		**M**	**M**	**M**
Dr. Sadiq Jaafar Hamandi	**Ph.D, Mechanical Engineering, 2000**	ASP	PS	FT	24	24	24		M	M	M
Dr. Logean Qadri Ibrahim	**Ph.D , Glass and Ceramic Engineering**	ASP	PS	FT							
Dr. Hadeel Kassim Wadi Aljobouri	**Ph.D, PhD, Biomedical Engineering**	ASP	PS	FT	19	19	19		L	M	M

Dr. Rana Ibrahim Mahmood	**Ph.D ,** Biology	ASP	PS	FT	21	16	21		M	M	L

Dr. Dr. Ali Mahdi Miftin	**Ph.D ,** structural Engineering	L	PS	FT	23	11	18		M	M	M
Dr. Eman Ghadhban Khalil	Ph.D.	L	PS	FT	26	24	26		M	M	M
Dr. Hassanain Ali Lafta Mossa	**Ph.D,** Biomedical Engineering	L	PS	FT	20	20	20		M	M	L
Dr. Aseel Mohammed Ali Hussein Ghazwan	Ph.D, Biomedical Engineering	L	PS	FT	18	18	18				
Dr. Samar Ali Jaber	Ph.D, Biomedical Engineering	L	PS	FT	17	13	13				
Dr. Alaa Ayyed Jebur Al-Taie	Ph.D, Biomedical Engineering	L	PS	FT	13	13	13	**Eng. Assoc. of Iraq**	M	M	M

Dr. Dunia Tahseen Nema Al-Aridhi	Ph.D, Clinical Biochemistry	L	PS	FT	35	35	34				
Dr. Mais Odai Abdul Rassul	Ph.D, Biomedical Engineering	L	PS	FT	13	13	13		M	M	L

Dr. Jassim Mohammed Sahan	Ph.D, Electronic Engineering and Communication Engineering	L	PS	FT	20	10	20		M	M	L
Dr. Basma Abdulsahib Faihan	Ph.D, Biomedical Engineering	L	PS	FT	7	12	12	**Eng. Assoc. of Iraq**	M	M	L
Dr. Muna Mustafa Kareem	Ph.D, Biomedical Engineering	L	PS	FT	12	12	1		M	M	L
Dr. Hussain A. Jaber	Ph.D, Electrical and Electronic Engineering/Medical Engineering	L	PS	FT	24	9	1	**Eng. Assoc. of Iraq**	M	M	H

Dr. Sara asure	Ph.D, Biomedical Engineering	ASL	PS	FT					M	M	L
Dr. Mahmood Hameed Majeed	Ph.D, Biomedical Engineering	ASL	PS	FT					H	M	L
Dr. Safa Layth Kailan	Ph.D, Biomedical Engineering	ASL	PS	FT					M	M	L
Dr. Reem Shakir Mahmood	Ph.D, Biomedical Engineering	ASL	PS	FT	12	12	12		M	M	L
Dr. Noor Ali Sadek	Ph.D, Biomedical Engineering	ASL	PS	FT	3	7	7		H	M	L

Asst. Lec. Qais Ahmed Habash	Ph.D,, Biomedical Engineering	ASL	PS	FT	14	14	14		H	M	L

Asst. Lec. Faten Imad Ali	MSc, Biomedical Engineering	L	PS	FT	14	10	10		H	M	L
Asst. Lec. Hamza Abbas Fadhil Ibrahim	MSc, Biomedical Engineering	ASL	PS	FT	7	3	7		M	M	L
Asst. Lec. Duaa Nawfal Hazim	Msc, Electronic Engineering and Communication Engineering	ASL	PS	FT	4	3	1		M	M	L
Asst. Lec. Fatima Ibrahim Yasser	Msc, Electrical and Electronic/Electronic and Communication Engineering	ASL	PS	FT	2	2	1		M	M	L
Asst. Lec. Abdullah Nasser Ibraheem	Msc, Electrical and Electronic/Electronic and Communication Engineering	ASL	PS	FT	3	1	1		M	M	L

Asst. Lec. Ahmed Lateef Khudarahm	Msc, Electronic Engineering and Communication Engineering	ASL	PS	FT	0	1	1		M	M	L
Asst. Lec. Zaid Mustafa Khudair	Msc, Electronic Engineering and Communication Engineering	ASL	PS	FT	9	1	1		M	M	L
Asst. Lec. Arkan Saad Muhammad	Msc, Material Engineering	ASL	PS	FT	12	1	1		M	M	L
Asst. Lec. Enas Shehab Ahmed	MSc, Anatomy and Histology	ASL	PS	FT	0	1	18		M	M	L
Asst. Lec. Noor Basim	MSc, Biomedical Engineering	L	PS	FT	0	1	1		M	M	

Eng. Nadia Ahmed Mohammed	MSc, Biomedical Engineering	L	PS	FT	0	1	1		M	M	
Eng. Noor Ali Masaoud	B.Sc, Biomedical Engineering	O	PS	FT	0	1	1		M	M	
Eng. Mohammed Hussein Ghazi	B.Sc, Electronic Engineering and Communication Engineering	O	PS	FT	1	1	1		M	M	

[1] Code: P = Professor, ASP = Assistant Professor, L = Lecturer, ASL = Assistant Lecturer, and O = Other.

[2] Code: PS = Permanent Staff, TS = Temporary Staff.

[3] FT = Full Time Faculty or PT = Part Time Faculty, at the institution.

[4] The level of activity, H = high, M= Medium or L=Low.

6.2 Faculty Workload

The normal teaching assignment for a full-time faculty in the professorial ranks is 12 credits per semester (including senior design supervision load), and 15 credits per semester for lecturers.

The faculty teaching load typically involves preparation for two courses. One of the two courses have one section and the other has two sections making total of nine credits in class teaching. In addition, each faculty member supervises about two senior design project, which is equivalent to two to three credit hours per semester. For more details see Table (6.5).

The teaching load of faculty holding administrative duties, including Chairs of Departments, Deans and Vice-Deans of Colleges, directors of administrative units, coordinators of programs, and others who are assigned special duties by the Chancellor are reduced by 2 to 6 credit hours, depending on the position. Faculty members are generally assigned teaching assistants to assist in grading and tutoring. The faculty workload summary is provided in Table 6.2. It includes information in terms of workload expectations and requirements for all faculty members.

Table 6.2: Faculty Workload Summary

Faculty Member Name	FT or PT	Classes Taught (Course No./Credit Hrs.) Term and Year	Program Activity Distribution			% Of Time Devoted To The Program
			Teaching	Research Or Scholarship	Other	
Dr. Auns Qusai Hashim Al-Neami	FT	6/13 hrs	40%	30%	50%	100%
Dr. Sadiq Jaafar Hamandi	FT	Biomechanics I (MDER410/3) 1 Biomechanics II (MDER420/3) 2 Professional Ethics (UREQ510/1) 1 Biotribology (MDER522/2) 2	50%	40%	10%	100%
Dr. Logean Qadri Ibrahim	FT					
Dr. Hadeel Kassim Wadi Aljobouri	FT	6/ 18 hrs	50%	25%	25%	100%
Dr. Rana Ibrahim Mahmood	FT	BIOL110 / 3 / Bilogy - MDER223 / 2 / Limbs Anatomy - MDER312 / 2 / Trunk Anatomy - MDER322 / 2 / Head & Neck	50%	25%	25%	100%

		Anatomy - MDER 713 / 2/ Advanced Biomaterials				
Dr. Dr. Ali Mahdi Miftin	FT	Mathematics (Math110/4 hr. /1st term/2024), Calculus (Math120/5 hr./2nd term/2024), Engineering Mathematics (Math210/4 hr./1st term/2024), Analytical Mathematics (Math220/4 hr. /2nd term/2024), Analytical Mechanics (MDER 423, 2 hr. / 2nd term / 2024), project (CREQ 521 / 6 hr. / 1st and 2nd terms / 2024)	90%	10%		100%
Dr. Eman Ghadhban Khalil	FT	MDER314 histology/3, MDER325 bone injury and fractures/2, MDER416 pathology/2, POER325 Pathology II/2	60%	25%	15%	100%
Dr. Hassanain Ali Lafta Mossa	FT	MDER310/4/Engineering Analysis (1st Semester 3rd Year). MDER515/2/Rehabilitation Engineering (1st Semester 5th Year). MDER520/2/Modern Medical Equipment (2nd Semester Fifth Year). POER323/2/Medical Rehabiltation Engineering (2nd Semester POE 3rd Year).	80%	5%	15%	100%
Dr. Aseel Mohammed Ali Hussein Ghazwan	FT	MDER210/4/Engineering Mechanics I 1st semester, 2nd year; MDER220/4/Engineering Mechanics II 2nd semester, 2nd year; MDER311/3/Mechanics of Materials I 1st semester, 3rd year; MDER321/5/Mechanics of Materials II 2nd semester, 3rd year	50%	30%	20%	100%
Dr. Samar Ali Jaber	FT	1- Medical Instrumentation(4th year_1st sem.) 2- Engineering Drawing (1st year_1st	75%	15%	10%	100%

		sem.) 3- Therapeutic Instrumentation(4th year_2nd sem.) 4- Introduction to Biomedical Engineering(2nd year_2nd sem.) 5- Graduation project two students(5th year_1st and 2nd sem.)				
Dr. Alaa Ayyed Jebur Al-Taie	FT	Materials Science Biomaterials I Biomaterials II	60%	20%	20%	100%
Dr. Dunia Tahseen Nema Al-Aridhi	FT	chemistery, physiology, biologu	60%	25%	15%	100%
Dr. Mais Odai Abdul Rassul	FT					
Dr. Jassim Mohammed Sahan	FT	MDER315/3 Electronics III,1st semester, 3th year MDER514/2 Neural Network 1st semester, 5th year digital Lab/4 , 1st sem, 4th year MDER225/4, optical system design 2nd semester, 2nd year digital Lab/4 , 2nd semester, 4th year ,2 undergraduit projects/4	70%	15%	15%	100%
Dr. Basma Abdulsahib Faihan	FT	MDER415/3 1st semester, 4th year MDER426/2 2nd semester, 4th year biomechanics Lab/6 , 1st year, 4th year MDER525/4, 2nd semester, 5th year Control Lab/ 5, 2nd semester, 5th year	50	5	45	100%
Dr. Muna Mustafa Kareem	FT	CREQ520 Engineering Management/2, MDER 515 Elective I/2, POER316 Pathology I/2	60%	10%	30%	100%
Dr. Hussain A. Jaber	FT	MDER110/6 Hrs. Term1 and Year(1) MDER120/6 Hrs. Term2 and Year(1)	60%	15%	25%	100%

Dr. Sara asure		**Elective**	**50%**	**30%**	**20%**	
Dr. Mahmood Hameed Majeed		**Mathematics**	**50%**	**30%**	**20%**	
Dr. Safa Layth Kailan		**Physics**	**50%**	**30%**	**20%**	
Dr. Reem Shakir Mahmood	**FT**	**Numerical Analyssi Digital Image Processing**	**50%**	**50%**	**0%**	**100%**
Dr. Noor Ali Sadek	**FT**	**Hospital design and system, MDER515/2 Hrs.1st semester. 5th grade and MEMS MDER 535/2 Hrs.2nd semester, 5th grade**	**75%**	**15%**	**10%**	**100%**
Asst. Lec. Qais Ahmed Habash	**FT**	**Image processing /Neural network**	**60%**	**25%**	**15%**	**100%**
Asst. Lec. Faten Imad Ali	**FT**	**(MDER511 - Diagnostic Medical Equipment Lab – UGV – 1st Sem – 2h) - (MDER210 Electronics Lab I/3– 1st Sem – 3h)(Numerical Analysis Lab – UGIII – 2nd Sem – 2h) - (MDER220 Electronics Lab II /3– 2nd Sem – 3h)**	**50%**	**40%**	**10%**	**100%**
Asst. Lec. Hamza Abbas Fadhil Ibrahim	**FT**					
Asst. Lec. Doaa Nawfal Hazim	**FT**	**MATH120 Mathematics II / 5, MDER212 Numerical Analysis72, MDER423 Image Processing/4,CREQ121 Computer Fundamentals and Programming II/2, CREQ120 Engineering Drawing II/5, Communication lab/3**	**60%**	**10%**	**30%**	**100%**
Asst. Lec. Fatima ibrahim yasser	**FT**	**MDER110 Electrical Circuits I/3, MDER120 Electrical Circuits II/2 ,MDER212 Numerical Analysis72, MDER413 Digital Electronics I/4,**	**40%**	**30%**	**30%**	**100%**

		MDER424 Digital Electronics II /4, MDER423 Image Processing/4,CREQ121 Computer Fundamentals and Programming II/2, Experimental design 3rd year/2				
Asst. Lec. Abdullah Nasser Ibraheem	FT	(UREQ111 - Computer Fundamentals and Programming I Lab - UGI - 1st Sem - 2h) – (MDER212 - Numerical Analysis Lab – UGII – 1st Sem – 2h) - (MDER415 - Medical Imaging Instruments I Lab – UGIV – 1st Sem – 2h) - (MDER413 - Digital Electronics I Lab – UGIV – 1st Sem – 2h) – (MDER314 - Medical Measurement Instrumentation Lab – UGIII – 1st Sem – 2h) – (MDER511 - Diagnostic Medical Equipment Lab – UGV – 1st Sem – 2h) - (Numerical Analysis Lab – UGIII – 2nd Sem – 2h) – (MDER 421 – Biomechanics II Lab – UGIV – 2nd Sem – 3h) – (MDER424 – Digital Electronics II Lab – UGIV – 2nd Sem – 3h) – (MDER423 – Image Processing Lab – UGIV – 2nd Sem – 2h) – (MDER425 - Medical Imaging Instruments II Lab – UGIV – 2nd Sem – 2h)	50%	5%	45%	100%
Asst. Lec. Ahmed Lateef Khudarahm	FT	CREQ121 Computer Fundamentals and Programming II /4, Electrical Network/2, MDER110 Electrical Circuits I /3, MDER120 Electrical Circuits II/2, MDER210 Electronics I/3, MDER220 Electronics II /3	60%	10%	30%	100%
Asst. Lec. Zaid Mustafa Khudair	FT	UREQ111 Computer Fundamentals and Programming I/4, CREQ120 Engineering	60%	10%	30%	100%

		Drawing II/5, UREQ111 Computer Fundamentals and Programming I/2, CREQ121 Computer Fundamentals and Programming II/2,MDER520 Control II /2				
Asst. Lec. Arkan Saad Mohammed raoof	FT	material Lab. 2, Strength of materials Lab.2 , Biomechanic lab 3 , CREQ120 Workshop 3, Digital Electronics II 3	60%	10%	30%	100%
Asst. Lec. Enas Shehab Ahmed	FT	MDER213/2,MDER222/2, MDER313/3, CREQ180/3	60%	10%	30%	100%
Eng. Nadia Ahmed Mohammed	FT	UREQ111 Computer Fundamentals and Programming I/4, CREQ120 Engineering Drawing II/3, MDER110 Electrical Circuits I /3, MDER120 Electrical Circuits II/2, MDER210 Electronics I/3, MDER220 Electronics II /3, Programming II/2, MDER520 Control II /2	50%	0%	50%	100%
Asst. Lec. Noor Basim		UREQ111 Computer Fundamentals and Programming I/4, CREQ120 Engineering Drawing II/3, MDER110 Electrical Circuits I /3, MDER120 Electrical Circuits II/2, MDER210 Electronics I/3, MDER220 Electronics II /3, Programming II/2, MDER520 Control II /2	50%	0%	50%	100%
Eng Noor Ali Masaoud	FT					

Eng. Mohammed Hussein Ghazi	**FT**	**UREQ111 Computer Fundamentals and Programming I/4, CREQ120 Engineering Drawing II/3, MDER110 Electrical Circuits I /3, MDER120 Electrical Circuits II/2, MDER210 Electronics I/3, MDER220 Electronics II /3, Programming II/2, MDER520 Control II /2**	**50%**	**0%**	**50%**	**100%**

FT = Full Time Faculty or PT = Part Time Faculty, at the institution.

For the academic year for which the Self-Assessment Report is being prepared.

Program activity distribution should be in percent of effort in the program and should total 100%.

Indicate sabbatical leave, etc., under "Other." 5. Out of the total time employed at the institution.

6.3 Faculty Size

The BME Department has adequate faculty members to cover the teaching load and meet the teaching requirements of the various core areas in BME. The Department includes 37 full time faculty members. This number is sufficient to meet the department's needs according to the department's vision. Most of the faculty members in the Department were educated in the Iraq, UK, Turkey, and Malaysia.

Several factors define the Department's needs and allocation in terms of number of faculty. Some of the factors listed below are common to all universities and some are unique to Al-Nahrain University and similar institutions:

- Numbers of students enrolled.
- Student intake per semester.
- Areas of focus in curriculum.
- Strategic focus of Department.
- Flexibility of university in terms of faculty teaching loads.
- Delegation of faculty to special tasks and assignments.
- Minimum class size to open a section.
- Maximum class size to justify opening new sections.
- Faculty leaves arrangements.
- Graduate program staffing requirements.

The University requires each department to assess its needs for faculty on an annual basis. At the beginning of each academic year, the department needs are assessed in view of projected teaching and other workload assignments. A series of forms known as the New Faculty Request Forms are completed by the department to indicate the existing faculty workloads, projected workloads, and department needs are filled-out in this regard. Requests for new positions are accompanied by request to advertise the positions in certain venues including the University Website and the Ministry of Higher Education. These requirements are discussed for review and assessment first within the department and college, and then sent to the Vice Chancellor for Academic Affairs for processing within the Senior University Administration system. Upon approval, the positions are advertised. Throughout the process, the Department enjoys full support from the senior university administration and so far, all requests for faculty positions have been supported as possible. In addition, the BME Department analyzes students advising

and other extracurricular activities requirements to ensure that enough faculty members are available to support these activities. Normally, students seek individual appointments with their assigned faculty advisor or visit their advisors during the office hours to review their progress and performance, and to discuss any issue or concern. Faculty members extend their availability in terms of office hours during intensive advising weeks.

6.4 Faculty Development

Faculty members are actively involved in professional development activities, as shown in Table 6.3. The department supports and encourages faculty to benefit from the various professional development opportunities offered by the university. These include participating in courses offered by our college's Continuing Education Unit, such as the "Ethical Safety" course (Ref. H.N/1/2/424 on 9/4/2023) and helping to prepare the workshop titled "Preparing and Organizing a Promotion File" (Ref. H.N/1/2/170 on 5/2/2023), along with many other workshops and seminars focused on faculty professional development. The Deanship of Graduate Studies and Scientific Research provides academic development opportunities in the form of research grants, the establishment and support of interdisciplinary research groups, and research visits to reputable universities and research institutions. An example of this is the formation of a research team to activate the terms of the scientific cooperation agreement between Al-Nahrain University and Tanaka University of Malaysia, as per letter H.N/1/1/5182 on 5/28/2024. The university also organizes workshops and forums aimed at enhancing the educational process (teaching and learning), providing training on the use of IT in education, and focusing on educational assessment and continuous improvement. Local, regional, and international experts from the Industry Advisory Board (IAB) are invited to share their knowledge and experience with all faculties. Thus, the department ensures sustained faculty development through a comprehensive set of professional training and capacity-building activities, as clearly documented in Table 6.3.

Table 6.3 the activity of the faculty members in BME department for the last five years.

Year	Activity	Total No.	Details
2024-2025	Workshop	**17**	1. Early Detection of Breast Cancer. 2. Laws and Regulations Related to Employment. 3. The role of program accreditation in successful bologna process implementation 4. Discussion sessions for undergraduate and graduate student projects. 5. Artificial intelligence in healthcare. 6. Teaching and learning: their relationship with total quality. 7. Improving global rankings. 8. Electronic system for academic promotions. 9. Occupational safety. 10. Introduction of research funding. 11. Importance of research funding. 12. Early detection of breast tumors. 13. Workshop on Research Methodologies 14. Workshop on Scientific Writing 15. Workshop on Advanced Biomedical Devices 16. Workshop on Accreditation Standards 17. Workshop on Innovation in Higher Education
	Training Course	**11**	1. Training: Iraqi Standards for Educational Lab Quality (16 Mar 2025) 2. Mechanism for Implementing Iraqi Standards for the Quality of Educational Laboratories with the Guideline Manual. 3. Mechanism for implementing Iraqi standards for the quality of educational laboratories. 4. Laws and regulations related to employment/work duties. 5. National Higher Education Strategy Program. 6. Program for Developing the Capacities of University Leadership and Human Resources. 7. E-Learning Platforms 8. SPSS and Data Analysis 9. Laboratory Safety

			10. AI in Healthcare 11. Leadership Skills
	Scientific Symposium	**9**	1. Digital Transformation in Higher Education 2. Humanities and Social Sciences 3. Biomedical Engineering and Applications 4. Artificial Intelligence in Healthcare 5. Biomedical Innovations 6. Smart Health Systems 7. Nanotechnology in Medicine 8. Wireless Body Area Networks 9. Climate and Health
	Seminar	**6**	1. E-Seminar: Early Detection of Breast Cancer (11 Jul 2025) 2. Academic Writing Skills 3. Modern Teaching Methods 4. Intellectual Property Rights 5. Peer-Review Process 6. Critical Thinking in Education
	Conference	9	1. International Conference on Engineering Education 2. International Conference on Biomedical Engineering 3. Conference on Quality Assurance in Higher Education 4. Conference on Artificial Intelligence in Medicine 5. National Conference on Future of Higher Education
2023-2024	Workshop	**15**	1. Developments in Medical Imaging (repeat) - Nanotechnology & Biomaterials in 2. Medicine Rules & Regulations of Civil Service (15 Dec 2024) 3. Discussion sessions for undergraduate and graduate student projects. 4. Workshop on advancements in medical imaging devices and their use in improving curricula and linking them to the job market. 5. Unlocking the secrets of Nano linearities in biomedical systems- and Technologies. 6. Unveiling the secrets of nanolithography in biomedical systems and technologies. 7. Safety and Civil Defense. 8. Management and organization of resources for research and theses using **Mendeley** software. 9. Preparation and organization of the academic promotion file.

			10. Workshop on Cyber Harassment 11. Statistical Analysis 12. Curriculum Development 13. Project Management 14. Educational Technology 15. Research Ethics
	Training Course	**8**	1. Training: Iraqi Standards for Educational Lab Quality (16 Mar 2025) 2. Tranquilizers: The Path to Addiction 3. New Graduates Training and Orientation Program. 4. MATLAB Applications 5. Clinical Engineering Tools 6. Remote Learning 7. Scientific Presentations 8. Data Security
	Scientific Symposium	**5**	1. Sustainable Technologies 2. Robotics in Healthcare 3. Wireless Communication 4. Biomedical Signal Processing 5. IoT in Education
	Seminar	**6**	1. - Al-Nahrain Forum (3 Mar) 2. Publishing in High-Impact Journals 3. Research Collaboration 4. Time Management for Academics 5. Grant Proposal Development 6. Multidisciplinary Studies
	Conference	7	1. - ASU ICETSIS 2024 - Salud, Ciencia y Tecnología Conf. (8 Jun 2024) 2. - 5th Int. Conf. on Biomedical & Health Sciences (Cihan Univ. Erbil, 6–7 Mar 2024) 3. National Conference on Higher Education Development 4. International Conference on Smart Cities 5. Conference on Digital Learning 6. Conference on Environmental Engineering 7. International Conference on Healthcare Technology

2022-2023	Workshop	**9**	1. Developments in Medical Imaging - Unlocking Nano-Linearities in Biomedical Systems 2. Safety & Civil Defense - Research Resource Management with *Mendeley* - Scientific 3. Promotion File Preparation - Digital Drugs & Youth Awareness - Combating Violence 4. Against Women - Anti-Cyber Harassment - Early Detection of Breast Cancer 5. Curriculum Mapping 6. Outcome-Based Education 7. Simulation Tools 8. Mixed Reality in Education 9. Assessment Techniques
	Training Course	**5**	1. Python for Data Science 2. Research Design 3. Teaching with Technology 4. Quality Standards 5. Bioinformatics
	Scientific Symposium	**5**	1. Telemedicine 2. Cloud Computing 3. Renewable Energy Applications 4. Medical Imaging 5. Cybersecurity in Healthcare
	Seminar	**6**	1. Scientific Seminar: Graduate & Undergraduate Projects 2. Student-Centered Teaching 3. Innovation in Pedagogy 4. Global Health Challenges 5. Data-Driven Research 6. Intellectual Collaboration
	Conference	**6**	1. SmartNets 2023 - ICMSA 2023 - IEEE IBITeC 2023 2. International Conference on Biomedical Engineering 3. Renewable Energy in Medicine 4. Conference on E-Learning 5. Artificial Intelligence in Education 6. National Conference on Academic Leadership

2021-2022	Workshop	**8**	1. Workshop: Histotechniques for Tissue Slide Preparation 2. Safety and Civil Defense. 3. Workshop on Cyber Harassment. 4. Quality Assurance 5. Accreditation Standards 6. Outcome-Based Assessment 7. Curriculum Innovation 8. Educational Psychology
	Training Course	**5**	1. Communication Skills 2. Research Tools 3. Data Analysis 4. Leadership in Higher Education 5. Simulation in Medicine
	Scientific Symposium	**5**	1. Renewable Energy in Healthcare 2. Nanomaterials 3. AI in Engineering 4. Biomedical Sensors 5. Sustainable Development
	Seminar	1	N/A
	Conference	6	1. 3rd Int. Conf. on Engineering Sciences (15 Dec 2022)
2020-2021	Workshop	1	1. Workshop: Nanotechnology & Biomaterials in Medicine (28 Jan) 2. Workshop: Histotechniques for Tissue Slide Preparation
	Training Course	**5**	1. Grant Writing 2. Collaborative Research 3. Digital Transformation 4. Engineering Ethics 5. Career Development
	Scientific Symposium	**6**	1. World Biomechanics Day with ASB (7 Apr) 2. Conference on Innovation in Science and Technology 3. Medical Devices 4. International Conference on E-Health 5. Conference on Academic Accreditation 6. National Conference on Engineering Education

	Seminar	**5**	1. Lecture: Biomedical Research Ethics (Lund, Sweden, 9 Oct 2020) 2. Al-Nahrain Forum (3 Mar) 3. Ethics in Research 4. Global Research Trends 5. Education after COVID-19
	Conference	5	1. Int. Conf. on Physical Science & Advanced Materials (UAE, 24–27 Oct 2020) - IConMEAS 2020 (Malaysia, 28–30 Dec 2020) - IEEE MECBME 2020 (Jordan, 27–29 Oct 2020) 2. Al-Noor Int. Conf. for Sci. & Tech. (Oman, 11 Aug 2020) - iCareTech 2020 (Assistive & Rehabilitation Tech.) 3. IICETA 2020 (Engineering Tech. & Apps) - IOP Conf. Series: Materials Sci. & Eng. 671 (2020) 4. National Conference on Digital Transformation 5. International Conference on Smart Learning

6.5 Faculty Authority and Responsibility

Al-Nahrain University has a well-established decision-making process that outlines the responsibilities and authorities of the faculty as per the University Bylaws. At the Department level, the faculty is primarily responsible for all curricular and academic affairs related to the program. This includes deciding on which courses are required within the curricula and determining what new positions are needed, and in which areas. Important decisions related to the curriculum or hiring for vacant positions involve the formation of designated committees to analyze the requirements and to bring recommendations to the Department Council for deliberation and approval.

The development and implementation of the assessment, evaluation, and continuing improvement of the curriculum and courses are primarily a faculty responsibility. Every course is assigned a coordinator (i.e., course coordinator) who is responsible for course updating, maintenance, and development. To improve or add new courses, faculty members and course coordinators follow a systematic procedure that is well-established. The teacher has the right to change the curriculum by 20% as he deems appropriate without the approval of the Deans Committee in order to participate in the improvement plan.

The BME Department has representatives on the College-level and University-level committees that coordinate academic and administrative activities across the BME Department, the College of Engineering, and the University. This coordination includes identification of best practices, sharing of central data, and ensuring communication concerning basic logistics, procedures, and deadlines.

The University Bylaws specify the duties and responsibilities of faculty members. The main duties are the following:

1. **Teaching:** Teaching and curriculum development are the main duties of faculty members at Al-Nahrain University.
2. **Research:** Faculty members are expected to actively engage in and lead relevant research, publish their research findings in recognized specialized journals, and present their results at regional and international forums and conferences.

3. **Academic Advising:** Faculty members are assigned academic advising duties to guide students through completing their graduation requirements, assist students with relevant academic issues during their studies, and to help them graduate from the University.
4. **Contribute to Administration:** All faculty members are expected to contribute to the development of the university and get actively involved in relevant committees and tasks at the Department, College and/or University levels.
5. **Community Service:** This entails serving the local community and the profession through providing services and leadership to fulfill their needs and contributing to their advancement.

Table 6.4 shows the weights allocated by the university for each of the five performance categories. The University is planning to give flexibility to the faculty members in terms of distributing their efforts between teaching and research in order to release research active faculties from part of the teaching load if possible. Table 6.5 shows the teaching load for the teaching staff in BME department.

Table 6.4: Assigned Weights for Faculty Involvement in Academic Duties

Faculty Activity	Allocated Points for Faculty in Professional Ranks	Allocated Points for Lectures
Teaching	**75% - 95 %**	**75% - 95%**
Research	**70%-90%**	**60%-90%**
Student Advising	**15%**	**15%**
Administrative Service	**15%-20%**	**15%-20%**
Community Service	**10%-15%**	**10 – 15%**

CRITERION 7: ADMINISTRATIVE SUPPORT

The Biomedical Engineering Department (BME) has sufficient Institutional Support and Financial Resources to ensure the quality and sustainability of the program in support of the Program's Educational Objectives and Graduate Outcomes. The administrative support is sufficient to attract on an ongoing basis qualified faculty. The resources also ensure the department's ability to acquire, maintain, and operate the facility and associated equipment.

7.1 Leadership and Administrative Services

BME has a clear organizational structure that is updated at the start of every academic year. The Department Chair assumes the leadership of the B.Sc. in the field of Biomedical Engineering Program. Dr. Auns Q. Hashim assumed the position of department chair effective beginning of summer 2023. The Department Chair meets with the College Dean on a regular basis to discuss the department matters. The chair is entitled to a quarter teaching load reduction along with a monthly financial allowance.

The responsibilities of the department chair include preparation and management of the department's annual evaluation of faculty and staff. The chair also leads the process of planning to hire candidates for full-time academic and non-academic positions, at the department level, based on deliberations of appointed search committees and the department council.

Each faculty member, staff, and employee in the department has a defined function and role. Both faculty and staff in the Department have a role in the decision making through the various functions and committees that they participate in, with the council of faculty members serving as the ultimate forum in which issues are discussed and decisions are made at the department level. Formal minutes of meetings of the Department Council and committees are recorded and approved by all members. The roles of Faculty, Department Chair, Department Council, College Dean, College council, and other individuals and entities are well defined in the

University Bylaws. The Department’s organization chart is shown in Fig. 7.1.

Chairperson’s Role

1. Preparation of department’s needs after consultation with other faculty and staff members in the department so that it can be taken into consideration when the budget is prepared.

2. Maintaining records for the activities of the department, university documents relating to the department and supervision of their use in accordance with rules and practices followed in the University.
3. Supervising the selection of course textbooks and references.
4. Proposing the distribution of courses to be taught among staff members and submitting it to the Departmental Council.
5. Encouraging academic research and assisting faculty members in conducting research.
6. Distributing students amongst academic advisors and following up the progress of their study plans.

Faculty Role

1. Teaching and conducting examinations.
2. Conducting original research.
3. Supervision of dissertations, student research and student academic and social activities.
4. Academic advising.
5. Participation in University committees and in councils and committees which the University approves or participates in.
6. Devoting himself to his academic duties at the University and maintaining the levels appropriate to the University position and reputation in the fields of research, teaching, guidance, and administration.
7. Performance of any tasks requested by the President or College Dean given that such tasks are not incompatible with the nature of their work.
8. Serving the local community and fulfilling its needs.

Staff Role

Staff member's duties include conducting administrative tasks, lab supervision and taking care of technical issues. The main responsibility of staff is providing support services, such as secretariat, lab supervision and budget preparation that are necessary for the support and success of the program.

7.2 Faculty Support

7.2.1 Faculty Recruitment

In General, the university requires each department in the university to specify its needs from faculty members at the beginning of each academic year. Then, all these needs are assessed according to the expected teaching and other workload tasks. These requirements are discussed and approved first within the department and college, next forwarded to the Vice President for Scientific Affairs for processing. Upon approval, positions are announced after the financial support is available from the Ministry of Finance.

It is noteworthy, the appointment of faculty members (teaching staff) in the Ministry of Higher Education and Scientific Research and its administrative formations and the educational and research institutions associated with it is subject to Law No. (40) of 1988 of the Ministry of Higher Education and Scientific Research and University Service Law No. (23) Of 2008.

The following requirements must be met by faculty members:

Personal features, professional and scientific competence, educational competence, contribution to community service. In addition, the faculty member must participate in the teaching methods course, as well as pass the teaching competency test.

1. Analysis of the current situation
2. Alignment with the university's strategic plan
3. Calculation of teaching load
4. Submission of annual staffing needs
5. Approval of the plan by the relevant committees
6. Job announcements
7. Selection and recruitment process

7.2.2 Faculty Retention and Promotion

Scientific promotions in the Ministry of Higher Education and Scientific Research are undergone to Scientific Promotions Law No. (167) for the year 2017. Under the Scientific
Promotions Law No. (167) for the year 2017, there are four scientific titles namely, assistant lecturer, lecturer, assistant professor, and professor. The conditions of promotion to each scientific title are detailed as follows,

- A faculty member can be granted the title of assistant lecturer if he/ she obtains a higher university degree (Master) and passes the teaching methods course, as well as pass the teaching competency test.
- A faculty member can be promoted from an assistant lecturer to a lecturer after spending a period of no less than three years of service, during which he/ she obtains points totaling seventy points. (forty-six point within table number (1) and twenty-four points within table number (2), noting that the details of tables (1) and (2) are found in the Scientific Promotions Law referred to above).
- A faculty member can be promoted from a lecturer to an assistant professor after spending a period of no less than four years of service, during which he/ she obtains points totaling eighty points. (Fifty-two point within table number (1) and twenty-eight points within table number (2), noting that the details of tables (1) and (2) are found in the Scientific Promotions Law referred to above).
- A faculty member can be promoted from an assistant professor to professor after spending a period of no less than six years of service, during which he/ she obtains points totaling ninety points. (fifty-nine point within table number (1) and thirty-one points within table number (2), noting that the details of tables (1) and (2) are found in the Scientific Promotions Law referred to above).

It is worth mentioning that there is a committee of scientific promotion in each college. This committee is composed of five members at least with the rank of professor or assistant professor in different specializations. The scientific promotion committee undertakes the process of checking the papers and letters of scientific promotion in accordance with the provisions of the Scientific Promotions Law No. (167). Then, the scientific promotion committee sends the scientific promotion folder to the central scientific promotion committee in the head-quarter of the university in order to complete the promotion process.

7.2.3 Faculty Development Support

Biomedical Engineering department holds several seminars specifically for postgraduate students to share and discuss ideas and assessment the progress in their projects. Academic visits to healthcare centers are another activity to engage students with the real life of engineers. Competition of final year project is organized by BME department is proposed to encourage students in the final year produce the best within their projects. In addition, workshops in different subjects are hold through the academic year to help students reaching the goal of program and for staff as training chance to upgrade their skills.

Educational and Technology Courses are organized in continuing education center to teach the new staff how to teach, these courses were organized periodically for new member of staff. The teacher is rated by the Quality Assurance Committee using special form prepared by the Ministry of Higher Education and Scientific Research.

7.3 Technical and Administrative Staff Support

7.3.1 Staff Size and Qualification

The program has a number of staff for administration to support the faculty. Also, the program has several experienced engineers to run the labs. The staff of administration summary is provided in Table 7.1

7.3.2 Staff Recruitment and Retention

At present, the staff number is sufficient to support the needs of the educational program, but still, there is a need to hire new personnel. There is a plan from the Ministry of Higher Education to hire the first rank of students in the department annually.

7.3.3 Staff Development

To develop administrative staff, the BME department in cooperation with the engineering college has organized various workshops held and conducted by the BME department to develop the staff experience in different fields. In addition, the Center for Continuing Education of the University Presidency held training courses in several scopes such as maintenance, computer systems use and applications, and courses on the official and linguistic communications to use them in administrative work.

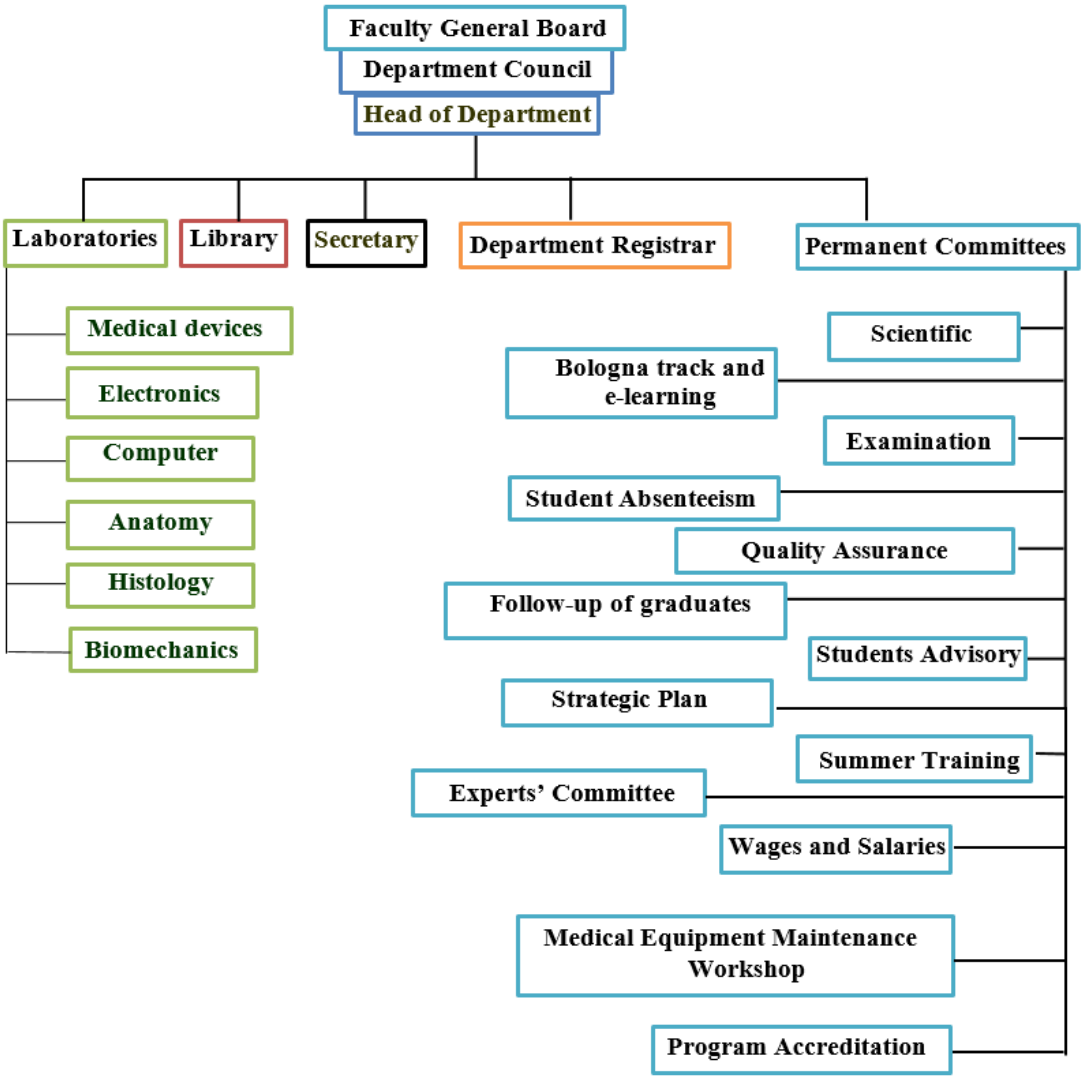

Fig. 7.1: Organizational Structure of the Department of Biomedical Engineering

The program staff consists of both administrative and technical employees, with varying academic backgrounds and years of experience. Specifically, two members are engaged in administrative roles and three members are classified as technical staff. Their qualifications range from bachelor's to master's degrees, and their professional experience varies from 2 to 7 years. This distribution provides a balanced support structure that contributes to the effective implementation and management of the program's activities as shown in table 7.1.

Table 7.1: Staff of administration Qualifications

Staff Names	Degree	Classification	Years of Experience
Eng. Aya	BSc. In Biomedical Engineering	administration	3
Assst Lec. Doaa	MSc. In Political Science	administration	2
Eng. Atheed	Bachelor of Mechanical Engineering	Technical	7
Eng. Mena	Bachelor of Civil Engineering	Technical	5
Eng. Mohammed Hussain	Bachelor of Electronica and Communication Engineering	Technical	2

CRITERION 8: FINANCIAL SUPPORT

8.1 Funding Resources

The ministry of the higher education is setting the budgets for all departments every year according to the central budget of the Ministry. The Higher Education Fund also contributes to supporting the department's scientific and administrative activities. In addition, there are some other funding resources like the Consultancy Bureau and evening study if applicable. The college has five main sources of funding:

1. Self-Funding: This includes amounts collected from postgraduate students under self-funded schemes.
2. Governmental Education (Parallel): This includes amounts collected from students enrolled in the governmental (parallel) education track.
3. Revenue: This includes amounts collected from official documents, the Continuing Education Division, and the Engineering Consulting Office.
4. Evening Studies: This includes amounts collected from students enrolled in evening study programs.
5. Hosting: This includes amounts collected from evening study students and those hosted in the morning study program.

These funding sources are based on the regulations and guidelines of the Higher Education Fund and the approved expenditure categories. They have continuity due to the admission channels and the existence of the Continuing Education Center, ensuring the ongoing financial support of the program accreditation and expenditure according to the approved categories within the Higher Education Fund.

8.2 Program Budget

In the department, the budget is typically prepared in the following manner

1. The College of Engineering has initiated a strategic planning process that serves in part as the basis for communicating to the University the status, priorities, strategies, and budget needs.
2. The College compiles an overall budget based on budget requests from all Departments and submits the budget to the University.
3. The Vice-President for Finance and Administrative Affairs and members of the Finance and Administrative Affairs Unit discuss the budget request from the College with the Dean and faculty

from the College, usually the Chairpersons and Assistant/Vice-Dean. The meeting is typically held for purposes of seeking clarifications and discussing requests in view of university policies and requirements.

4. Colleges are informed of approved budgets and details of approved items. The College of Engineering then discusses the budget in the College Board, and Departments start spending as per standard university procedures.
5. The Finance and Administrative Affairs Unit, with its various Departments and Units, exercises proper control over purchasing and inventory management.

The revenues mentioned above have been allocated based on the approved expenditure categories in accordance with the instructions of the Higher Education Fund. This ensures the adequacy of the program's financial allocations for purchasing, maintaining, and updating equipment, as well as meeting the program's needs for facilities, faculty, staff, and other teaching and learning requirements. The allocated amounts are shown in the table 8.1 and are based on the needs of the academic departments.

Table 8.1. Detailed Expenditure Report of the Biomedical Engineering Department

Scientific Departments	Biomedical Engineering
Machines and Equipment	**7,811,364 IQD**
Furniture	**17,110,953 IQD**
Maintenance Services	**14,455,534 IQD**
Fuels and Oils	**2,263,554 IQD**
Various Stationery and Supplies	**14,632,636 IQD**
Means of Transport and Transportation	**750000 IQD**
Discussion Fees	**8,305,272 IQD**
Transportation, Dispatch, and Communications	**1,470,272 IQD**
Various Service Expenses	**1,790,569 IQD**

8.2.1 Teaching and Learning Financial Support

The Department monitors and administers its own budget, which covers all departmental operational costs as well as capital equipment for the ongoing enhancement of undergraduate labs. The categories

include over-load teaching, maintenance and repair, and functional operations of undergraduate laboratories. The above report shows that the amounts disbursed according to the approved categories were 707,777,748 Iraqi Dinars (Seven hundred seven million, seven hundred seventy-seven thousand, seven hundred forty-eight IQD).

8.2.2 Facilities Financial Support

Each faculty room should have desk for each member in addition to air conditioning unit. Based on the expenditure records and allocation lists for the year 2024, the Department of Biomedical Engineering recorded the following expenditures:

1. 7,811,364 IQD for purchasing laboratory supplies and equipment to support teaching and learning activities.
2. 14,544,524 IQD for the maintenance of laboratory supplies and equipment, as well as the maintenance of the college and department infrastructure.
3. 17,110,953 IQD for purchasing items to provide a suitable learning environment, including furniture, field trips, display screens, and other office supplies.
4. 14,632,636 IQD for purchasing stationery and other supplies to support teaching and learning activities.

8.2.3 Faculty Financial Support

An amount of 1,470,272 IQD was spent on the transportation and delegation of faculty members for the purpose of developing the department's staff (faculty and other members), as well as on communications (internet subscription) to continuously enhance the skills of the faculty. This was achieved through:

1. Reviewing recent scientific research outcomes,
2. Communicating with international scientific centers, and
3. Publishing the department's outputs.

8.2.4 Staff Financial Support

Financial support from the institution is provided to continuously develop the skills of technical and administrative staff. This is implemented through the participation of administrative personnel in continuing education courses for development and learning purposes.

CRITERION 9: FACILITIES

The space and facilities allocated to the College of Engineering are adequate to allow all departments of the College to run and deliver their academic programs. The Department also utilizes classrooms and laboratories located in the adjacent buildings. A summary of offices, classrooms, and laboratories is described below.

9.1 Built Spaces and Associated Equipment

9.1.1 Offices

All offices (for faculty and staff) are fully equipped with up-to-date typical air conditioners, tables, and chairs are provided to satisfy the standard level for universal offices. Based on the needs, the faculty members may also be provided with a laptop computer, individual scanner, color printer, and other accessories. Each faculty is eligible to request other facilities and equipment that may facilitate his/her academic and research work in order to achieve the student outcomes. These requests are processed through the yearly budget requirements of the BME Department. The following pictures clarify some of these offices.

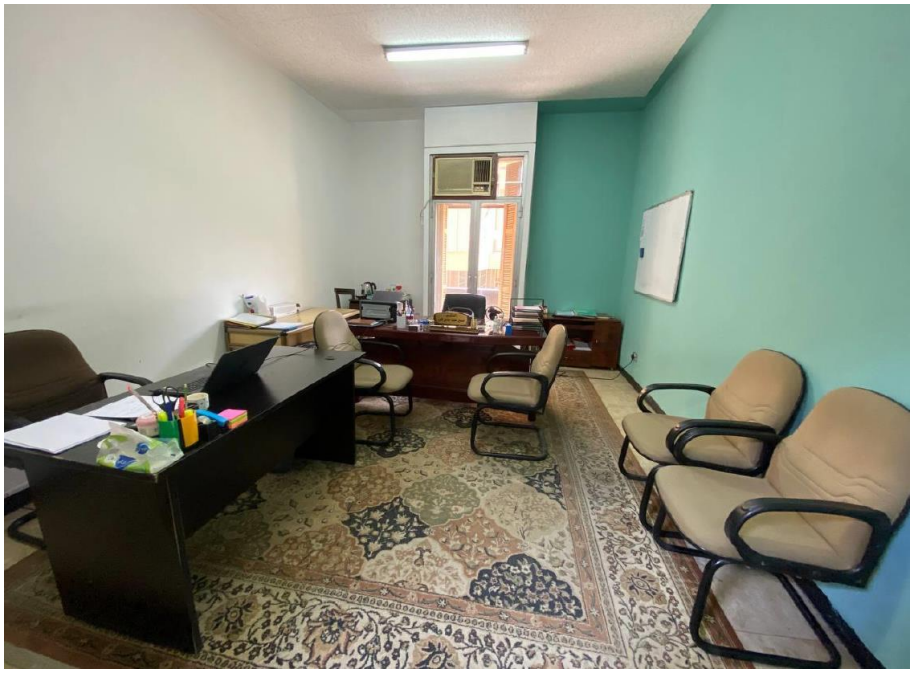

Fig. 9.1 Faculty and staff office

9.1.2 Classrooms

Classrooms across the College are adequately equipped with all basic needs and technologies to provide support for teaching and learning activities, including students' desk, a large white board, and an overhead projector. Wireless internet connections are available in the department. The BME Department utilizes 5 classrooms with total capacity of 180 seats as shown in Table 9.1. Projectors and Data-shows is used to enable lecturers deliver the course requirements.

Table 9.1: The capacity of each classroom

	Lecturing (Halls)	**Area (m^2)**	**Capacity**
Room code	**Use as**		
1 (Dr. Albert)	Lecture room	70	80
2	Lecture room	40	40
3	Lecture room	40	40
4	Lecture room	40	40
5	Lecture room	40	40

Fig. 9.2 Lecture room

9.1.3 Laboratory facilities

The BME Department has a number of laboratories which are located in the main building to satisfy the practical experiments, training, and research related to BME. All the Department laboratories are described in Table 9.2:

Table 9.2: FREE Laboratory Facilities

Laboratory, Including Courses Taught	Condition of Laboratory	Capacity	Area (m^2)
Computer Lab.,	Very Good	20	50
Medical Devices Lab,	Good	35	50
Biomechanics Lab.	Good	20	50
Histology Lab	Very Good	25	50
Anatomy Lab	Very Good	30	50
Electronics Lab	Good	35	50

Computer Lab.,

Medical Devices Lab,

Biomechanics Lab.

Histology Lab

Anatomy Lab

Electronics Lab

Some of the equipment that is housed in the lab include:

Computer Lab, (for the Biomedical Engineering Department program)

NO	Rig Name	Status
1	Desktop Computer Dell	Valid
2	Desktop Computer Dell	Valid
3	Desktop Computer Dell	Valid
4	Desktop Computer Dell	Valid
5	Desktop Computer Dell	Valid
6	Desktop Computer Dell	Valid
7	Desktop Computer HP	Valid
8	Desktop Computer Dell	Valid
9	Desktop Computer Dell	Valid
10	Desktop Computer Dell	Valid
11	Desktop Computer HP	Valid
12	Desktop Computer HP	Valid
13	Desktop Computer Dell	Valid
14	Desktop Computer Dell	Valid
15	Desktop Computer Dell	Valid
16	Desktop Computer HP	Valid

17	Desktop Computer Dell	Valid
18	Tables	Valid
19	Desktop Table	Valid
20	Chairs	Valid
21	LG Screen	Valid
22	White Board	Valid

Medical Devices Lab, (for the Biomedical Engineering Department program)

NO	Rig Name	Status
1	Spectrophotometer 6715 / Vis.	Working
2	Nd YAG Laser	Working
3	Digital Ultrasonic Therapy Unit	Working
4	Monitor	Consumed
5	Thearacard 400	Consumed
6	Flame Photometer	Consumed

7	NIHON KOHDEN - Celtac - MEK 6410K	Consumed
8	NÜVE - NT 715	Consumed
9	Blood Gases - ESCHWEILER - ECOSYS II	Consumed
10	Micro Centerifuge - MSE	Consumed
11	Digital Storage Oscilloscope - ATTEN	Consumed
12	DAMAC Coulter Counter - DANAM Vector 6	Consumed
13	DC Shock	Consumed
14	KarlStorz - Xenon Light Source 611	Consumed
15	Micrscope - Wetzlar - GERMANY	Consumed
16	Detector Output Measurement Unit	Consumed
17	Automated External Defibrilator	Consumed
18	OPTO - MECHATRONICS OVT. LTD - HOLMARC	Consumed
19	Spectrophotometer - SPECTRONIC 20 - MILTON ROY COMPANY	Consumed
20	FEEDBACK CNC 932	Consumed
21	R.F Oscillator - RIDDE India	Consumed
22	LED SURTRON Touch	Consumed
23	SIRECUST 404N - SIEMENS - مونتير صالة العلميات	Unknown
24	Electric Sucker - AMEDA egnell Universal	Unknown
25	Infusion Pump System - INFUSOMAT	Unknown
26	Infusion Pump System - IVAC Model 598	Unknown
27	SHANDON VOKAN - 400	Unknown
28	VENTIMETER - AIR SHIELDS - CONTROLLER II	Unknown
29	SERVO Ventillator (900B - SIEMENS ELEMA SWEDISH	Unknown
30	Smart Needle Monitor - PONTIAC - General Hospital 19621	Unknown
31	Cold Light Supply	Unknown
32	Ultrasound System - VOLUSION 5300 - Kretz Technik	Unknown
33	Ultrasound System - Old Version	Working
34	Anesthesia System - Sulla 808	Working
35	Siemens Mobilett II portable X-Ray	Consumed
36	Dental chair- SIRONA C4	Consumed
37	Dental chair - White Color	Consumed
38	Infant Incubator - Atom Infant Incubator - V-85	Unknown
39	KL72001 - Biomedical Measurement System	Working
40	Techbook Scientech / Blood Pressure Measurement	Working
41	Techbook Scientech / Monitor	Working
42	Techbook Scientech / ECG	Working
43	Techbook Scientech / EMG	Working
44	Techbook Scientech / EEGn	Working
45	Techbook Scientech / Pacemaker	Working
46	High Eficiency Filter KY 0003 - Monnal D2	Unknown

47	Spectrophotometer - PERKIN - ELMER	Unknown
48	Ultrsonic Thearpy Unit	Unknown
49	Electro Surgey Unit - ESCHMANN TD311	Consumed
50	LIGHT SOURCE 2150 - DOWNS	Unknown
51	COLD LIGHT FOUNTAIN 485	Unknown
52	Electromyography	Unknown
53	SPIROMETER 1 - CONTEC SP10	Working
54	SPIROMETER 2 - CONTEC SP10	Working
55	Remote ECG Monitor	Working
56	Endoscopy - OLYMPUS LF - 1	Working
57	Endoscopy - OLYMPUS GIF - Type Q20	Working
58	CHEST Spirometry	Unknown
59	Video Graphical Printer - UP 897	Working
60	Video Graphical Printer - UP 890	Working
61	Portable Ultrasound	Working
62	Ultrasound	Working
63	The Ultimate B/W Digital Ultrasound 128 - Medison	Working
64	Desktop Computer - HPLV1911 MONITOR	Working
65	Desktop Computer - Case	Working
66	Desktop Computer - Case	Working
67	Desktop Computer - UPS	Working
68	Laptop DELL	Working

Biomechanics Lab. (for the Biomedical Engineering Department program)

NO	Rig Name	Valid or not
1	AMTI AccuGait force plate	Valid
2	AMTI BP600900 force plate	Valid
3	AMTI OR6-6 force plate	Valid
4	AMTI Accpower force plate	Valid
5	AMTI Force 5 (with hip-spine kit)	Valid
6	AMTI Pin-on-disc	Valid
7	Vickers Hardness tester	Valid
8	Training bicycle	Valid
9	Mg-1908/6 Treadmill	Valid
10	Torsion test	Valid
11	Biomechanical arm simulation device	Valid
12	weight scale sf-400 (1-5000g)	Valid
13	Portable Electronic Scale (0-10 kg)	Valid
14	TGT-300A	Valid
15	Weight and Height Scale 3306 ABV (0-120 kg)	Valid
16	Gunt Humburge f1200 for Photoelasticity	Valid

Histology Lab. (for the Biomedical Engineering Department program)

NO	Rig Name	Valid or not
1	Microscope	Valid
2	Microscope	Valid
3	Microscope	Valid
4	Microscope	Valid
5	Microscope	Valid
6	Microscope	Valid
7	Microscope	Valid
8	Microscope	Valid
9	Microscope	Valid
10	Microscope	Valid

11	Microscope	Valid
12	Microscope	Valid
13	Microscope	Valid
14	Microscope	Valid
15	Microscope	Not valid
16	Microscope	Not valid
17	Microscope	Not valid
18	Microscope	Not valid
19	Microscope	Not valid
20	Microscope	Not valid
21	Micro-hematocrit centirfuge	Valid
22	Over-head	Valid
23	Ultrasonic Cleaner	Valid
24	80-1 Electric Centeifuge	Valid
25	1 Stage Vacuum pump	Valid
26	Heating Mantle	Valid
27	Electronic scale	Valid
28	Hot plate stirrer	Valid
29	Elektronische waage	Valid
30	Electronic scale	Valid

Anatomy Lab. (for the Biomedical Engineering Department program)

NO	Rig Name	Valid or not
1	Ear model	Valid
2	Teath model	Valid
3	Section veiw of kidney	Valid
4	Ear model	Valid
5	Brain model	Valid
6	Skull model	Valid
7	Teath model	Valid
8	Skull model	Valid
9	Skeleton	Valid
10	left upper limb	Valid
11	Section of the skin	Valid
12	Trunk model	Valid
13	Heart model	Valid
14	model	Valid
15	Elbo joint	Valid
16	sholder joint model	Valid
17	joints	Valid
18	Vertebal model	Valid
19	knee joint	Valid
20	elbo joint	Valid
21	Vertebal model	Valid
22	Vertebal model	Valid
23	Skeleton	Valid
24	Anatomy of the heart	Valid
25	HIP and knee	Valid
26	High Blood pressure	Valid
27	Disorders of the eye	Valid
28	The skin	Valid
29	Bone and joint Diseases	Valid
30	left lower limb	Valid
31	right lower limb	Valid
32	right lower limb	Valid
33	hand	Valid
34	knee joint	Valid

Electronics Lab. (for the Biomedical Engineering Department program)

NO	Rig Name	Valid or not
1	Digital Multimeter	Not valid
2	DC Power Supply	Valid
3	Function Generator	Valid
4	Oscilloscope	Valid
5	Analog and Digital Laboratory Unit	Valid
6	Analouge Voltmeter	Valid
7	Microprocessor	Valid
8	AKAD Kit	Valid
9	Elettronica Veneta PSU/EV	Valid
10	Insertion Faulty Unit	Valid
11	DC Electrical Circuit Kit I	Valid
12	AC Electrical Circuit II	Valid
13	DC Electronic Device Kit I	Valid
14	AC Electronic Device II	Valid
15	Network Switch	Valid

16	Sniffer Probe Kit PR261	Valid
17	Development Board PIC	Valid
18	Semiconductor Tester	Valid
19	Precision LCR Meter	Valid
20	Spectrum Analyzer	Valid
21	Logic Circuit Board	Valid
22	Bench	Valid
23	Locker	Valid
24	Desk	Valid
25	Desk Chair	Valid
26	Drawer	Valid
27	Components Container	Valid
28	Students Chair	Valid
29	Electrical Heater	Valid
30	Vertical AC	Valid
31	TV	Valid
32	White Board	Valid
33	Plastic Bin	Valid
34	On-wall Mounted Comp. Container	Valid
35	Fire Distinguisher	Valid
36	First Aid Kit	Valid
37	PC	Valid

9.2 Computer Lab

In the Biomedical Engineering Department general computer support is available by an expert team in the computer lab. Generally, Lab hours are 8 am to 6 pm, through Sunday to Thursday (excluding the national holidays).

The most commonly used computer lab by BME Department is located in the main Building. This computer laboratory is composed of 19 PCs, white board, and air conditioners. The software that is used within the curriculum includes Microsoft Office applications, MATLAB /Simulink, and AutoCAD. All the computer hardware and software systems more than adequately support the BME program educational objectives and outcomes.

9.3 Students Direction and Safety Precautions

The BME Department has several written signs to direct the students to the main parts of the department. Moreover, first aid boxes and fire extinguishers are available in the department.

9.3.1 Health center

Health care services are provided regardless of the patient's ability to pay and charge for these services. These health centers operate under the supervision of the University Boards of Directors.

9.3.2 Sport center

It provision of education, training, administration and organization of sporting and artistic activities in support of sport and artistic march both within and outside the university, in addition to cultural march through seminars, festivals and special conferences for the students specially given to upgrading the ideal student numbers to serve the nation in the development process through providing the appropriate atmosphere to practice his passion through the use of methods based on modern scientific foundations of higher, cultural and sports development to provide the society with scientific and technical capacities. In addition, there are Masjid, Fountain, and several Gardens.

9.4 Maintenance and Upgrading of Facilities

The department has implemented a systematic maintenance and upgrade plan to ensure the sustainability, safety, and modernization of its facilities and equipment. Recent actions include:

1. Roof maintenance for laboratory buildings completed on December 4, 2024 and January 5, 2025, which significantly reduced water leakage problems.

2. Improvement of lighting, ventilation, and cooling systems in classrooms and workshops, finalized on May 1, 2024.
3. Upgrading safety measures by installing new signage and updating safety standards, completed in May 2025.
4. Modernization of the electronics laboratory with digital measuring devices, leading to more efficient practical sessions.
5. Enhancement of wireless internet service, which increased student engagement with online platforms.

To ensure continuity, the department has established a Maintenance and Equipment Committee (formed on May 22, 2025) to oversee implementation, receive requests through an electronic reporting system, and provide monthly follow-up reports.

Looking ahead, the department has scheduled short- and mid-term plans for further improvements, including:

1. Replacing outdated laboratory equipment with modern alternatives starting from 2026.
2. Expanding the use of smart classroom technologies (interactive screens, digital tools, and advanced audio systems).
3. Supplying the digital library with updated scientific databases and references on an annual basis.
4. Periodic inspections of safety systems and infrastructure to maintain high readiness standards.

These measures collectively demonstrate not only the department's commitment to addressing immediate maintenance needs but also its forward-looking strategy to ensure continuous improvement and modernization of facilities in the near future.

9.5 Library Services

The college of engineering has an excellent library to provide students by textbooks, journals, and PhD students-thesis. In a very professional way students can loan any book form the library. Library is managed by an expert team. Hundreds of books are available for students though the working hours of library and can be loaned to help student achieve the course requirements. Besides, e-books are available for students. Overall, library successfully introduces an acceptable level of service.

The library services:

1- Borrowing books for the students from various departments in the college which includes (reference books, master's theses and doctoral theses).

2- The use of the Internet system available in the library to obtain the saved digital books in the main computer in the library

9.6 Overall Comments on Facilities

Currently, all facilities are acceptable in terms of students and other staff can do their aim successfully. However, financial issue is the most challenge to maintain and upgrade the current facilities. Most laboratories in The Biomedical Engineering department need for new devices and allocated area for each lab should be extended. This can be considered the main parameter in achieving the purpose of the academic program.

On the other hands, in order to safely accomplish program objectives, the following safety measures are taken in all facilities of the Biomedical Engineering.

Fire Safety:

All laboratories, classrooms halls, and corridors are equipped with fire extinguisher. In some laboratories, sand buckets are also provided for extinguishing fires in machines and equipment. **First Aid:**

First aid kits are available in all laboratories and main corridors where faculty offices are located.

Personal Protective Equipment:

All laboratories are equipped with personal protective gears, when needed, including:

- Safety gloves
- Masks
- Lab coats
- Face masks (for sparks, chips, etc.)

CRITERION 10: SPECIFIC PROGRAM CRITERIA

In Biomedical Engineering program, a specific program criterion is taken from the ICAEE requirements in addition to the usual University/College/Departmental requirements. The criteria set the following requirements:

1. Curriculum:

(a) Basic Sciences and Engineering Principles: Courses in mathematics (up to differential equations), statistics, physics, chemistry, biology, and human physiology, in addition to core engineering principles.

(b) Biomedical Problem-Solving: Courses such as medical measurements, medical devices, biomechanics, and medical signal processing.

(c) Analysis, Modeling, Design, and Implementation: Hands-on experience in biomedical device design, biomedical modeling, medical image analysis, and senior capstone projects.

(d) Measurements and Data Analysis: Practical training in medical measurements, biomedical electronics, and biomechanics laboratories.

2. Benchmarking with an Accredited Peer Program:

The program has been benchmarked against a well-recognized international program:

- **Bachelor of Science in Biomedical Engineering – Khalifa University, UAE** Program Link
- **Al-Nahrain University Program Link:** Biomedical Engineering Program – Al-Nahrain University

3. Comparison Between the Two Programs

Aspect	Al-Nahrain University/Biomedical Engineering	Khalifa University/Biomedical Engineering
Basic Sciences	Courses in mathematics (up to differential equations), statistics, physics, chemistry, biology, and human physiology.	Courses in mathematics (including calculus and differential equations), physics, chemistry, biology, and human physiology.
Engineering Applications	Courses in medical devices, biomedical electronics, medical signal processing, and biomechanics.	Courses in medical devices, biomechanics, molecular and cellular engineering, and biomedical modeling.

Aspect	Al-Nahrain University/Biomedical Engineering	Khalifa University/Biomedical Engineering
Design and Modeling	Capstone graduation projects, courses in biomedical system and device design, and dedicated design and analysis labs.	Multi-level capstone design projects, courses in medical systems design and biotechnologies.
Measurements and Data	Specialized labs in medical measurements, biomedical electronics, biomechanics, with focus on data collection and analysis from living systems.	Advanced labs in bio-instrumentation, clinical experiments, and biomedical data acquisition and analysis.
Alignment with (Appendix G)	Fully addresses the four required elements: (basic sciences – biomedical problem-solving – design and implementation – measurement and data analysis).	Also addresses the same four required elements in line with international accreditation standards.

The comparison shows that the two programs share the same core foundations (basic sciences - problem solving - design - measurements), with a natural difference in sub-specializations, which confirms that the University of Nahrain program covers all the requirements, while at the same time being in harmony with an accredited international program, which strengthens the accreditation file locally and internationally.

All the above requirements are fulfilled through the BME program extensive curriculum. The curriculum must be prepared to meet the students learning outcomes. The graduated students must able to apply knowledge of mathematics through calculus, deferential equations, physics, chemistry, and either computer science, data science, or an additional area of basic science. Moreover, the graduated student must be applying the essential concepts of the Biomedical engineering for general disciplines. Also, the prepared curriculum is keen to educate students on leadership and work ethics through a special course. The experimental side is one of the basic matters of the program. As it has many laboratories associated with theoretical materials to enhance the basic concepts of biomedical engineering. The interrelationship between biomedical disciplines is one of the important things that graduates should know through the acquired knowledge from the course projects and graduated project. In addition, the majority of the faculty teaching courses are qualified to teach the subjects matter by virtue of professional licensure, or by education and experience.

APPENDICES

APPENDIX A – Course Syllabus

CREQ180	Chemistry
MATH110	Mathematics
UREQ111	Computer Fundamentals and Programming I
CREQ110	Engineering Drawings
BIOL110	Biology
MDER110	Electrical Circuits I
HUDE110	Human Rights+ Democracy
PHYS110	Physics
MATH120	Fundamentals of Engineering Mathematics
CREQ121	Computer Fundamentals and Programming II
CREQ120	Engineering Graphics
MDER120	Electrical Circuits II
CREQ120	Workshop
URARA1	Arabic I
URBRC	Crimes of Defunct Baath Party
URENG1	Academic English I
UREQ213	Thorax & Limbs Anatomy
MATH210	Engineering Mathematics
MDER211	Engineering Mechanics (Statics)
MDER210	Fundamentals of Electronics
URARA2	Arabic II
MATH220	Analytical Mathematics
MDER221	Engineering Mechanics (Dynamics)
MDER220	Electronics Circuits
MANG220	Principle of Management
MDER222	Abdomen & Head Anatomy
URENG2	Academic English II
MDER226	Introduction to BME
MDER310	Engineering Analysis
MDER311	Mechanics of Materials I
MDER312	Trunk Anatomy
MDER313	Physiology I
MDER314	Histology
MDER315	Electronics III
MDER316	Medical Equipment I
MDER317	Experimental Design
UREQ320	English III

CREQ320	Engineering Statistics
MDER320	Numerical Analysis
MDER321	Mechanics of Materials II
MDER322	Head & Neck Anatomy
MDER323	Physiology II
MDER324	Medical Equipment II
MDER325	Bone Injury and Fractures
UREQ410	English IV
MDER410	Biomechanics I
MDER411	Biomaterials I
MDER412	Communications
MDER413	Medical Instrumentation
MDER414	Digital Electronics I
MDER415	Thermo-Fluid Mechanics I
MDER416	Pathology
MDER420	Biomechanics II
MDER421	Biomaterials II
MDER422	Telemedicine
MDER423	Analytical Mechanics
MDER424	Therapeutic Instrumentation
MDER425	Digital Electronics II
MDER426	Thermo-Fluid Mechanics II
MDER427	Image Processing
UREQ510	Professional Ethics
CREQ510	Project
MDER510	Control I
MDER511	Diagnostic Instrumentation
MDER512	Hospital System & Design
MDER513	Microprocessor
MDER514	Neural Networks
MDER515	Rehabilitation Engineering
MDER516	Nanotechnology; Tissue Engineering; 3D Printing
CREQ520	Engineering Management
CREQ521	Project
MDER520	Control II
MDER521	Modern Medical Equipment
MDER522	Biotribology
MDER523	Biomedical Sensors
MDER524	Electromechanical Design
MDER525	Surgery for BME

APPENDIX B – FACULTY VITAE

Name: Dr. Sadiq Jaafar Hamandi.

1. Education:

   B.Sc. in Mechanical Engineering - Baghdad University - 1992
   M.Sc. in Mechanical Engineering - Al-Nahrain University - 1995
   PhD. in Mechanical Engineering - Al-Nahrain University - 2000
2. Academic experience:

   Faculty in Al-Nahrain University/College of Engineering/Biomedical Engineering Department, 2000-till-now, Full Time.
   Decider of Biomedical Engineering Department, 2000-2012, 2014-2015
   Head of Biomedical Engineering Department, 2015-2023

3. Non-academic experience: None.

   2012 Fulbright Visiting Scholar Program, 10 weeks
   Member in Aqiq Institution for Charity, 2009- till-now
   Member of the examination committee of the Arab Board for Health Specialties, 2007-till-now

4. Briefly list the most important publications and presentations from the past five years: title, co-authors (if any), where published and/or presented, date of publication or presentation.

- Designing and Manufacturing of Low Load Compressive Testing Device for Soft Tissue B Rashid, S Khalil, 2023, AIP Conference Proceedings 2591, 040005 (2023)
- Creating a Digital 3D Model of the Dental Cast Using Structure-from-Motion Photogrammetry Technique
R Mahmood, S Hamandi, A Al-Mahdi, 2023, International Journal of Online and Biomedical Engineering, 19, (3), 4-17
- A study of the dynamic variability of the center of pressure during standing for normal subjects
B AlGhali, S Hamandi, H Abbas, R Badr, 2023, Cogent Engineering, 10, (1-8), 8
- MODIFICATION OF EXTRAMEDULLARY GUIDE FOR TIBIAL CUT IN TOTAL KNEE REPLACEMENT SURGERY IN INTERNAL TIBIAL TORSION
U KHAIRY, * *, S HAMANDI, A ALI, 2022
Journal of Engineering Science and Technology, 17, (4), 2254 - 2271

- The role of the Ilizarov method in treatment of lower limb fractures versus other techniques
O Jawad, S Hamandi, 2022, مجلة كلية المصطفى الجامعة, ١(١),١٣٩-١٢٦

- The Effect of Water on Mechanical Properties of 3D Printed Materials (St-PLA, PLA+, PLA and ABS)
M Hazim, S Hamandi, 2022, International Journal of Mechanical Engineering, 7, (1), 2211-2217

Proposed Geometrical Tool for Cases of Laterally Adapted Tibial Tubercle during Total Knee Replacement
K Khairy, U U.R., H Hamandi, S S.J., A Ali, A A.S., 2021, Advances in Orthopedics, 2021, (ID 5244034), 7

- Biomechanical study with kinematic and kinetic descriptions of the effect of high-heeled shoes in healthy adult females based on gait analysis
S Ruken, 2020, IOP Conference Series: Materials Science and Engineering, 671, (1), 012063

- Compare Between Gait Analysis of Patient with Ilizarov Leg and Prosthesis Leg
S Jawad, S Dia'a, 2020, Al-Nahrain Journal for Engineering Sciences, 23, (2), 178-186

- The Effect of Prosthetic Foot Type on Spatio-Temporal Parameters of Unilateral Below-Knee Amputees: A Case Study
H Abbas, S Hamandi, M Abdulsattar, Y Sabeeh, 2020, 2020 International Conference on Assistive and Rehabilitation Technologies (iCareTech), 51-56

- Effect of the Ilizarov Bone Fixation on Gait Cycle and Its Parameters
S Jawad, S Dia'a, 2020, International Journal of Online and Biomedical Engineering, 16, (11), 161-168

- Mechanical Analysis of Bone-Plate Construct Regarding Strength and Stiffness
S Abed, W Alsaadan, 2020, Al-Nahrain Journal for Engineering Sciences NJES, 23, (1), 89-93

- Friction and Wear Testing of Lubricated Joint Implant Material using AMTI Ortho-POD
S Shamki, 2020, IOP Conf. Series: Materials Science and Engineering, 757, (012048), 1-10

5. Briefly list the most recent professional development activities (if any): none

Name: Dr. Auns Qusai Hashim Al-Neami.

1. Education: Ph.D in Electrical Engineering-Biomedical Signal Processing/ University of Technology/Baghdad (Iraq)-2004

2. Academic experience: Lecturer at
   - Al-Kindi College of Medicine
   - Biomedical Engineering Department/ Al-Khwarizmi College/Baghdad University
   - Al-Nahrain University/ College of Engineering/ Biomedical Engineering Department /Baghdad (Iraq)
   - Head of Biomedical Engineering Department, 2023-now.

3. Non-academic experience: None.

4. Certification and professional organizations (if any).
   Many participation certificates from courses and workshops

5. Current membership in professional organization : none

6. Honors and Awards (if any):
   Achieved the award for supervising the best master's thesis, the creativity medal, and the medal from the Iraqi Inventors Forum.

7. Service activities (within and outside of the institution) : none

---

8. Briefly list the most important publications and presentations from the past five years: title, co-authors (if any), where published and/or presented, date of publication or presentation.

- Design and Manufacturing of Cap System to Prevent Chemotherapy-Induced Alopecia
  E Shukur1(B), A Al-Neami1, a Mohsen2, 2023
  Proceedings of the 2023 International Conference on Advances in Computing Research (ACR’23)

- Construction of brain model for neurosurgeons training based on 3D printing technology
  S Faraj, 2023
  AIP Conference Proceedings 2787, 090013 (2023)

- Liver fibrosis detection and classification for shear wave elastography (SWE) images based on convolutional neural network (CNN) ; Salih, 2023 AIP Conf. Proc. 2787, 090015-1–090015-10; https://doi.org/10.1063/5.0148350

- Liver fibrosis processing, multiclassification, and diagnosis based on hybrid machine learning approaches
  Z Jabbar1, A Al-Neami1, A Khawwam2, S Salih1, 2023
  Indonesian Journal of Electrical Engineering and Computer Science

- SEGMENTATION AND CREATION OF BRAIN TUMOR MODEL BASED ON ADVANCED TECHNIQUE
  S Kailan1, M Faraj2, A Neami3, 2023
  Azerbaijan Medical Journal

- Sleep Apnea Detection Methods: A Review
  A)1(, D Al-Aridhi)2(, D Al-Neami, 2023
  Damascus University Journal For Engineering Sciences

- Review of wireless Polysomnography System
  A Lateef, A Al-Aridhi†, 2023
  University of Thi -Qar Journal for Engineering Sciences

- A novel technique for intra-aortic balloon catheter tip localization based on sensing system design

  A Azhar, S S., A Alneami, A A.Q., A Alzubeidy, H H.H., 2023
  ◌ ̣AIP Conference Proceeding, AIP Conf. Proc. 2839, 080007 (2023), (AIP Conf. Proc. 2839, 080007 (2023))

- A New Simple, Cost-Effective Navigation System (EASY Navigator) for Neurosurgical Interventions
  M Faraj1, S Kailan2, A Al-Neami2, 2022
  WORLD NEUROSURGERY

- Error grid analysis evaluation of noninvasive blood glucose monitoring system of diabetic Covid-19 patients
  L Bachachea, , A Al-Neamia, J Hasana, 2022
  Int. J. Nonlinear Anal. Appl. 13 (2022) 1, 3697-3706

- Intra-Aortic Balloon Pump Catheter Tip Localization by Measuring the Perfusion Index Using a Designed Sensing System and Tracking the Blood Flowing Through the Kidney and The Upper Extremities

S Azhar1, A alneami1, H Alzubeidy1, 2022

9. Briefly list the most recent professional development activities (if any): none

Asst. Prof. Dr. Hadeel Kassim ALJOBOURI

1. Education: **PhD, Biomedical Engineering, Ankara Yıldırım Beyazıt University, 2017.**
2. Academic experience: **Al-Nahrain University/College of Engineering/Biomedical Engineering Department, Assistant Professor, 2004- now, Full Time.**
3. Non-academic experience: **AL-KADHYMIA EDUCATIONAL HOSPITAL, Baghdad, Iraq, Biomedical Engineer, (2000-2001, Full Time.**
4. Certification and professional organizations (if any).
5. Current membership in professional organization (if any).
6. Honors and Awards: **Turkish Government Scholarships for International Students, 2012.**
7. Service activities (within and outside of the institution) (if any).
8. Briefly list the most important publications and presentations from the past five years:

I. N. N. Nazeeh, H. A. Aljobouri, and M. Odai, "Design an Equivalent Left Ventricular Assist Device for Medical Equipment Labs," Journal of Biomedical Physics and Engineering, Jul. 2019.

II. H. A. Jaber, H. K. Aljobouri, I. Cankaya, O. M. Kocak, and O. Algin, "Preparing fMRI Data for Postprocessing: Conversion Modalities, Preprocessing Pipeline, and Parametric and Nonparametric Approaches," IEEE Access, vol. 7, pp. 122864–122877, 2019, doi: 10.1109/ACCESS.2019.2937482.

III. S. R. Tahhan and H. K. Aljobouri, "Sensing of Illegal Drugs by Using Photonic Crystal Fiber in Terahertz Regime," Journal of Optical Communications, vol. 1, no. ahead-of-print, Mar. 2020.

IV. H. K. Aljobouri, "Brain activity detection in single- and multi-subject PET data by Bayesian analysis," Research on Biomedical Engineering, pp. 1–7, Jun. 2020.

V. H. A. Jaber, I. Çankaya, H. K. Aljobouri, O. M. Koçak, and O. Algin, "Optimal Model-Free Approach Based on MDL and CHL for Active Brain Identification in fMRI Data Analysis," Current Medical Imaging Formerly Current Medical Imaging Reviews, vol. 17, no. 3, pp. 352–365, Aug. 2020.

VI. S. Mikha, H. K. Aljobouri, and A. affiliations, "CPAP Hardware/Simulation and Control Design for Respiratory Disorders: A Review," Al-Nahrain Journal for Engineering Sciences, vol. 24, no. 2, pp. 112–122, Dec. 2021.

VII. A. sabeeh Mikha and H. K. Aljobouri, "Simulation of continuous positive airway pressure device equipped with BLDC motor," AIP Conference Proceedings, vol. 2386, no. 1, p. 040007, Jan. 2022.

VIII. H. A. Jaber, H. K. Aljobouri, and I. Çankaya, "Design of a web laboratory

interface for ECG signal analysis using MATLAB builder NE," Open Computer Science, vol. 12, no. 1, pp. 227–237, Jan. 2022.

IX. W. S. Aboud, H. K. Aljobouri, and H. S. A. Al-Amir, "A Robust Controller Design for Simple Robotic Human Arm," Indonesian Journal of Electrical Engineering and Informatics (IJEEI), vol. 10, no. 3, pp. 655–667, Sep. 2022.

X. H. K. Aljobouri, "Independent Component Analysis with Functional Neuroscience Data Analysis," Journal of Biomedical Physics and Engineering, vol. 13, no. 2, pp. 169–180, Apr. 2023.

XI. J. F. Abdulkareem and H. K. Aljobouri, "Chest CT Images Analysis with Deep Learning Algorithms for COVID-19 Diagnostic for Iraqi Center," AIP Conference Proceedings, vol. 2414, no. 1, Feb. 2023.

XII. Z. K. Alkordy, N.H., Aljobouri, H.K. and Wadi, "Feature Extraction and Selection of Kidney Ultrasound Images Using a Deep CNN and PCA," Proceedings of 6th Computational Methods in Systems and Software 2022, vol. 1, pp. 104–114, 2023.

XIII. S. M. Alnedawe and H. K. Aljobouri, "A New Model Design for Combating COVID -19 Pandemic Based on SVM and CNN Approaches," Baghdad Science Journal, vol. 20, no. 4, pp. 1402–1402, Aug. 2023.

XIV. H. Diaa AL-rubaie, H. K. Aljobouri, Z. J. AL-Jobawi, and I. Çankaya, "Convolutional Neural Network Deep Learning Model for Improved Ultrasound Breast Tumor Classification," Al-Nahrain Journal for Engineering Sciences , vol. 26, no. 2, pp. 57–62, Jul. 2023.

XV. A. M. Hasan, N. K. N. Al-Waely, H. K. Ajobouri, R. W. Ibrahim, H. A. Jalab, and F. Meziane, "A classification model of breast masses in DCE-MRI using kinetic curves features with quantum-Raina's polynomial based fusion," Biomedical Signal Processing and Control, vol. 84, p. 105002, Jul. 2023.

XVI. A. M. Hasan, N. K. N. Al-Waely, H. K. Aljobouri, H. A. Jalab, R. W. Ibrahim, and F. Meziane, "Molecular subtypes classification of breast cancer in DCE-MRI using deep features," Expert Systems with Applications, vol. 236, p. 121371, Feb. 2024.

XVII. A. M. Hasan, H. K. Aljobouri, N. K. N. Al-Waely, R. W. Ibrahim, H. A. Jalab, and F. Meziane, "Diagnosis of breast cancer based on hybrid features extraction in dynamic contrast enhanced magnetic resonance imaging," Neural Computing and Applications, pp. 1–14, Aug. 2023.

XVIII. S. M. Alnedawe and H. K. Aljobouri, "Deep learning applications with a CNN model design for fighting COVID-19 pandemic: A review," in AIP Conference Proceedings, 2023, vol. 2804, no. 1.

XIX. N. B. Khalaf, H. K. Aljobouri, and M. S. Najim, "Identification and Classification of Retinal Diseases by Using Deep Learning Models," in 2023 International Conference on Smart Applications, Communications and Networking, SmartNets 2023, 2023.

XX. H. D. Alrubaie, H. K. Aljobouri, and Z. J. Aljobawi, "Efficient Feature Selection Using CNN, VGG16 and PCA for Breast Cancer Ultrasound Detection," Revue

d'Intelligence Artificielle, vol. 37, no. 5, pp. 1255–1261, 2023.

XXI. F. B. Sedeeq, H. K. Aljobouri, and J. A. Hasan, "A Systematic Review of Brain MRI Segmentation and Uncertainty Modeling Using Evidence Theory with Implementation of Fuzzy Clustering and Fuzzy Inference Systems Methods," Revue d'Intelligence Artificielle, vol. 37, no. 6, pp. 1537–1544, 2023.

Name: Dr. Rana Ibrahim Mahmood.

1. **Education:** PhD, Biology / Zoology, University of Baghdad, 2021.
2. **Academic experience:** Al-Nahrain University / College of Engineering / Biomedical Engineering Department, Assistant Professor, (Department Rapporteur), 2003-now, Full Time.
3. **Non-academic experience:** None.
4. **Certification and professional organizations:** None
5. **Current membership in professional organization:** None
6. **Honors and Awards:** Outstanding Paper Award 2023 / Nahrain University.
7. **Service activities (within and outside of the institution):** None
8. **Publications:**

- Biosynthesis of copper oxide nanoparticles mediated Annona muricata as cytotoxic and apoptosis inducer factor in breast cancer cell lines. R Mahmood, A Kadhim, S Ibraheem, S Albukhaty, H Mohammed-Salih, R Abbas, M Jabir, M Mohammed, U Nayef, F AlMalki, G Al-Karagoly, 2022 Scientific Reports, 2022, (12), 10.
- In vitro evaluation of antioxidant and cytotoxic activity of folate-methotrexate conjugated to bovine serum albumin nanoparticles against MCF-7, HepG2, and PC3 cell lines. A Al-Rahim, R Mahmood, M Mohammed, D Omer, 2022. Gene Reports, 29, (2022), 5.
- A Low Cost Microscope Prototype. R Mahmood, K Mahmoud, A Ghazi, 2021. AIP Conference Proceedings, 2372, (030004).
- Protein profile of MCF-7 breast cancer cell line treated with lectin delivered by CaCO3NPs revealed changes in molecular chaperones, cytoskeleton, and membrane-associated proteins. R Mahmood, A Abbass, N Razali, A Al-Saffar, J f, 2021. International Journal of Biological Macromolecules, 184, (3), 636-647.
- Evaluation of antioxidant enzyme activity in doxorubicin treated breast Cancer patients in Iraq: A molecular and cytotoxic study. N Hadi, R Mahmood, A Al-Saffar, 2021. Gene Reports, 24, (2), 101285.
- LC-MS/MS Proteomic Study of MCF-7 Cell Treated with Dox and Dox-Loaded Calcium Carbonate Nanoparticles Revealed Changes in Proteins Related to Glycolysis,

Actin Signalling, and Energy Metabolism. H Ahmed, M Ajat, R Mahmood, R Mansor, I Razak, J Al-Obaidi, N Razali, A Jaji, A Bakar, 2021. Biology, 10, (9), 1-21.

- The effect of some plants extract on hormonal and testicular function in rats. R CHALAB, R MAHMOOD, 2020. International Journal of Pharmaceutical Research, 12, (2), 1223-1228.
- Hypoglycemic and Hypolipidemic Properties of Three Plants Extract in Alloxan Induced Diabetic Rats. S Muhsin, R Mahmood, R Abdul-Lattif, D Sabrei, 2019. Plant Archives, 19, (2), 1558-156

Name: Dr. Ali Mahdi Miftin.

1. **Education**: PhD, Civil Structural Engineering, University of Babylon, 2016.
2. **Academic experience**:

   University of Baghdad / College of Engineering/, Lecturer, 2 years , part time.

   Al-Nahrain University / College of Engineering/, Lecturer, 2016 -present , Full Time.
3. **Non-academic experience**:

   Structural Engineer / Al-Nahrain University / Engineering department/, 2006 -2010 , Full Time.
4. **Certification and professional organizations**:
   Institute of Engineers / Australia
5. **Current membership in professional organization**:
   Iraqi Engineers Union.

Name: Dr .Eman Ghadhban Khalil.

1. Education: PhD in Pathology, College of Medicine , AL Nahrain University 2003

2. Academic experience:- AL Nahrain University- College of Medicine pathology depart &.histology depart - medical research Centre ,\ Al-Nahrain University/College of Engineering/Biomedical Engineering Department, Lecturer.

3. Non-academic experience: Researcher in ; medical research center - Al-Nahrain University&in Brest cancer centre –college of medicine Baghdad U.

4. Certification and professional organizations (if any). Several certificates of appreciation

&two patents

5. Current membership in professional organization (if any). Member of laboratory audit committee of the college of engineering ,Al nahrain university . - Member of quality assurance in the biomedical engineering department

6. Honors and Awards (if any).

7. Service activities (within and outside of the institution) (if any). 2011-2013 member in Brest cancer centre –college of medicine Baghdad U.

8. Briefly list the most important publications and presentations from the past five years: title, co-authors (if any), where published and/or presented, date of publication or presentation.

    1. 1-Using different calcination temperatures and solvents to assess the synthesized CuO NPs as an anti-bacterial agent. 2nd International Conference in Physical Science & Advanced Materials (PAM2020), AIP conference.2020

    2. 2-Functionalization of SWCNTs to detect anti-CCP by quartz microbalance(QCM). 2nd International Conference in Physical Science & Advanced Materials (PAM2020), AIP conference.2020

    3. 3-Measurement of Cartilage Deformation in Intact Knee Joints under Compressive Loading.2021

    4. 4-Development of the determination of ABO and Rh systems of blood group typing using Acousto- optical technique. PAM 2020 Conference 23-25 October 2020 Istanbul/ Turkey-DUBAI

    5. 5-Evaluate the fabricated polycaprolacton /chitosan_based electrospun nanometers for skin regeneration. TMREES-2021 Conference in Athens-Greece ,May 28 to30 2021 6-Photoacoustic technique for diagnosis of blood clotting.

    6. 7-Designing and manufacturing of low load compressive testing device for soft tissue. 8-Microscopic Imaging of Red Cell Aggregation with Photoacoustic Technique. 9-Evaluate the In Vitro Compatibility of a Fabricated Pcl: Cs Blends, and Pcl Scaffolds.

    7. 10-Design and development of photoacoustic system for accurate detection of erythrocyte aggregation.

    8. 11/Design and development of photoacoustic system for accurate detection of erythrocyte aggregation.

9. 12/Advancements in laser and ultrasound therapeutic strategies for cancer cells :recent review.

10. 13/Enhancement the Agglutination of Erythrocytes in Blood Typing Test by AcoustoOptic Technique. Al-Nahrain Journal for Engineering Sciences NJES.2020

11. 14/Design and Manifactering of low load Compressive Testing Device for Soft Tissues .MAICT 2021(AIP)

12. 15/A Comparison of Six Ultrasound Stimulation Types on Pseudomonas Aeruginosa Growth in Vitro. J Biomed Phys Eng 2018; 8(2)

13. 16/Effect of electrical current stimulation on Pseudomonas Aeruginosa growth J. Phys. Conf. Ser 1003, 012112 IOP Conf. Series: Journal of Physics: Conf. Series 1003 (2018) 012112 doi :10.1088/1742-6596/1003/1/012112

14. 17/Alternative Electrical Current Inhibiting effect on Bacteria (Pseudomonas aeruginosa).The Second Conference of Post Graduate Researches (CPGR'2017) College of Engineering, Al-Nahrain Univ., Baghdad, Iraq - 4th Oct. 2017 pp.168-172
18/Pseudomonas aeruginosa Membrane Capacitive Characteristic and Frequency Relative Power Consumptions. J Biotechnol Biomater 8 (281), 2,2018

15. 19/ Titanium Dioxide Nanoparticles Synthesis by Pulsed Laser. The International Journal of Engineering and Science.2019

16. 20/Impact of Gold nanoparticles sizes and concentrations on the Rhabdomyosarcoma cells. IOP Conf. Series: Materials Science and Engineering.2020

17. 21/Cultured Cell Lines Influenced by the Sizes and Concentrations of the Cytotoxic Gold Nanoparticles. RJPBCS 7 (6), Pag No. 2610.2016

18. 22/Detection of tumor mass based on laser scanning imaging. Al-Nahrain Journal for
19. Engineering Sciences (NJES).2017

20. 23/A COMPARATIVE STUDY OF USING DIODE LASER, ULTRASOUND AND ALTERNATING CURRENT IN WOUND HEALING. i-manager’s Journal on Future Engineering & Technology 12 (3), from page no. 10.2017.

21. 24/Prediction of Changes in Topographical Parameters for Corneal Reshaping Laser Surgery. 2 nd conference of post graduate researches (CPGR2O17)College of engineering AL Nahrain U.2017

22. 25/THE CYTOTOXIC EFFECTS OF GOLD NANOPARTICLES ON L20B CELL LINE. RESEARCH JOURNAL OF PHARMACEUTICAL, BIOLOGICAL AND CHEMICAL SCIENCES 9 (1), 892.2018

23. 26/The effect of calcination temperature and solvent on the synthesis of CuO nanoparticles and assessment as an anti-leishmania agent. AIP conference proceedings 2190(1),020067.2019

24. Briefly list the most recent professional development activities (if any).

-Participation in the cihan erbil 2024 conference (research) -Member of the peer committee with university of dohuk -Member of the peer committee with university of technology

-Participation in organizing and holding scientific visits with students and faculty to hospitals

in karbala nd baghdad -patent evaluation

-holding 3 workshops in the Al-Nahrain University/College of Engineering/Biomedical Engineering Department.

-performing volunteer work inside & outside the college of engineering.

Member of the national classification & accreditation programs in the Al-Nahrain University/College of Engineering/Biomedical Engineering Department.

Member of discussion graduate &postgraduate students projects.

Name: Dr Hassanain Ali Lafta Mossa.

2. Education:

• PhD, Medical Engineering, Cardiff University, United Kingdom, 2018.

• MSc, Medical Engineering, College of Engineering, Al-Nahrain University, Iraq, 2004.

• BSc, Biomedical Engineering, College of Engineering, Baghdad University, Iraq, 2000.

3. Academic experience:

♣ External Lecturer in Biomedical Engineering Department, Faculty of Engineering, University of Duhok: September 2022- till present.

♣ Rapporteur of the Biomedical Engineering Department, College of Engineering, AlNahrain University: September 2019 – September 2021.

♣ Academic Staff Member in the Biomedical Engineering Department, College of Engineering, Al-Nahrain University: August 2004 - till present.

♣ PhD researcher at School of Engineering, Cardiff University, United Kingdom: July 2013-July 2018.

♣ Lecturer in the Biomedical Engineering Department, College of Engineering, Al-Nahrain University: November 2012 - till present.

♣ External Lecturer in Al-Hussain Engineering University College, Karbala: September 2011- September 2012.

♣ Assistant Lecturer in the Biomedical Engineering Department , College of Engineering, Al-Nahrain University since August 2004 – November 2012.

4. Non-academic experience: None. ((في حالة وجود خبرة خارج التعليمcompany or entity, title,

brief description of position, 20xx-20xx, full time or part time?)

5. Certification and professional organizations (if any).

6. Current membership in professional organization (if any).

7. Honors and Awards (if any).

8. Service activities (within and outside of the institution) (if any).

9. Briefly list the most important publications and presentations from the past five years: title, co-authors (if any), where published and/or presented, date of publication or presentation.

♣ Hassanain Ali Lafta, Ali Adel Madlol. Parotidectomy Surgical Simulation and Education with a Three-dimensional Printed Face Model for Iraqi Surgeons. Frontiers in Biomedical Technologies, 2024, Vol.11, No.2.

♣ Hassanain Ali Lafta. *Quantification and Analysis of Human Hand Anthropometry: An Iraqi Study*. Journal of Advanced Technology and Engineering Exploration, 2023, Vol.10, No.101, pp 471-484.

♣ Taif Nabeel Muslim, Hassanain Ali Lafta. Sensor based System for Hand Function Assessment. University of Thi Qar Journal for Engineering Sciences, 2023, Vol.13, No.1, pp 56-65.

♣ Hazem Ali Jassim, Hassanain Ali Lafta. Force Sensitive Resistor Feedback with Assistive Walker Device. Eurasian Journal of Engineering and Technology, 2022, Vol.9, pp 105-113.

♣ Hazem Ali Jassim, Hassanain Ali Lafta. Investigating Satisfaction and Usability of an Embedded Multi-sensors based Autonomous Walker Assistive Device. Global Scientific Journal of Biology, 2022, Vol.7, No. 2, pp 93-102.

♣ Hassanain Ali Lafta, Shatha Yaseen Zamil. Design Feasibility Study of PET/CT Facility in Iraq. International Journal of Healthcare Systems Engineering, 2022, 3;009.

♣ Hassanain Ali Lafta, Gemma Whatling, Cathy Holt. *Impact of Upper Body Anthropometrics of Spatiotemporal Parameters during Manual Wheelchair Propulsion in Able-bodied User*. 2020 IEEE 5th Middle East and Africa Conference on Biomedical Engineering (MECBME).

♣ Hassanain Ali Lafta, Robert Gubby, Gemma Whatling, Cathy Holt. *Impact of Rear Wheel Axle Position on Upper Limb Kinematics and Electromyography during Manual Wheelchair Use*. International Biomechanics, 2018, Vol.5, No.1, pp 17-29.

• The 17th Annual Middle Eastern Simulation and Modelling Conference (MESM'2022), Baghdad, Iraq, 27-28, June 2022. Two Published Papers;
Simulation of Control Framework and Multisensor Based Design for Autonomous Walker Assisted Device.
A New Approach for Measuring 3D Mandibular Kinematics in Healthy and TMD Individuals.

• The 4th Scientific Conference for Electrical Engineering Techniques Research (EETR 2022), Baghdad, Iraq, 8-9 June 2022. Two Published Papers;
Designing an Embedded Multi-Sensor Autonomous System for Walker-Assisted Locomotion.
Analysis of Reliability in 3D Mandibular Movements Measurements.

• The 5th International Conference on Engineering Sciences (ICES 2021), Karbala, Iraq, 28-29 December 2021. Published Paper; *An Expert Approach for Sleep Analysis in Iraqi Obstructive Sleep Apnea Patients.*

• The Scientific Symposium of Biomedical Engineering Department, College of Engineering, AlNahrain University and the American Society of Biomechaincs, April 2021. *National*

Biomechanics Day. Podium Presentation; Wheelchair Biomechanics.

- The 3rd International Conference on Materials Engineering and Science (IConMEAS), Kuala Lumpur, Malaysia, December 2020. Session Chairman.
- The 5th IEEE Middle East and Africa Conference on Biomedical Engineering (MECBME), Amman, Jordan, October 2020. Podium Presentation; *Impact of Upper Body Anthropometrics of Spatiotemporal Parameters during Manual Wheelchair Propulsion in Able-bodied User*.
- The Scientific Symposium of Biomedical Engineering Department, College of Engineering, AlNahrain University, February 2020. *Ethics in Biomedical Research*.
- The Workshop of Biomedical Engineering Department, College of Engineering, Al-Nahrain University, March 2019. *The Realistic Role of NUBME Graduates for Developing the Healthcare Service in Iraq*.

Name: Dr Aseel Mohammed Ali Hussein.

2. Education: PhD, Medical Engineering, Cardiff University, 2017.
3. Academic experience: Al-Nahrain University/College of Engineering/Biomedical Engineering Department, Lecturer, 2005-now, Full Time.
4. Non-academic experience: None.
5. Certification and professional organizations (if any).
6. Current membership in professional organization (if any).
7. Honors and Awards (if any).
8. Service activities (within and outside of the institution) (if any).
9. Briefly list the most important publications and presentations from the past five years: title, co-authors (if any), where published and/or presented, date of publication or presentation.

a. The Impact of flat foot on the Clinical Measurement of Foot Posture and Dynamic Balance
M Ghazwan, 2023
2023 IEEE Jordan International Joint Conference on Electrical Engineering and Information Technology (JEEIT), 18-21

b. A low-cost podoscope for extracting morphological features of the foot
R Musaid, A Ghazwan, W Al-Saadan, 2023
Periodicals of Engineering and Natural Sciences, 11, (3), 269-280

c. Multi criteria decision making for optimal below knee prosthetic design
M Sattar, A Ghazwan, 2023
Periodicals of Engineering and Natural Sciences, 11, (3), 29-38

d. Study and analysis of the mechanical properties and pressure socket for through-knee amputation

M Sattar, A Abbas, 2023
International Journal of Advanced Technology and Engineering Exploration (IJATEE), 10, (105)
e. Radiographic imaging-based joint degradation detection using deep learning
A Ghazwan, S Abdulmunem, 2023
International Journal of Advanced Technology and Engineering Exploration (IJATEE), 10, (108)
f. Gait asymmetry according to limb dominance
S Ghazwan, 2023
The Fourth Scientific Conference for Electrical Engineering Techniques Research (EETR2022), 2804, (1)
g. Functional Gait Analysis Based on IR system
A Murtadha, 2022 Patent, 7273, (2020/624)
h. Knee osteoarthritis alters peri-articular knee muscle strategies during gait
A Ghazwan, C Wilson, C Holt, G Whatling, 2022 PLOS ONE, 17, (1)
i. The Correlation Between Gastrocnemius Muscle Thickness and Activity Limitations in Patients with Severe OA
A Ghazwan, W Alsaadan, a Rany, 2021
IOP Conf. Series: Materials Science and Engineering, 1067, (012138)
j. Are Muscular and Biomechanical Changes at the Knee Associated with Osteoarthritis Severity?
A Ghazwan, C Holt, G Whatling., 2018
64 Annual Meeting of the Orthopaedic Research Society, New Orleans, USA.
k. Can activities of daily living contribute to EMG normalization for gait analysis?
A Ghazwan, S Forrest, C Holt, G Whatling, 2017 PloS one, 12, (4), e0174670
l. Do the patterns of muscle forces are changed in the pathological gait?
A Ghazwan, C Wilson, C Holt, a Whatling, 2017

Cardiff School of Engineering Research Conference, Gregynog, UK.
m. Detecting muscle activity in knee osteoarthritis patients during gait: the role of quiet standing in the Teager-Kaiser energy operator method
P Jones, P Biggs, J Williams, A Ghazwan, G Whatling, a Holt, 2017 XXVI Congress of the International Society of Biomechanics, Brisbane, Australia.
n. Muscles Strategies During Different stages of OA
A Ghazwan, C Wilson, G Whatling, C Holt, 2017
XXVI Congress of the International Society of Biomechanics, Brisbane, Australia.
o. Knee loading and neuromuscular activity differs for early and late stage OA
A Ghazwan, C Wilson, C Holt, G Whatling, 2017
XXVI Congress of the International Society of Biomechanics, Brisbane, Australia.
p. Muscle Strategies and Mechanical Loading in Patients with Osteoarthritis
A Ghazwan, 2017 Cardiff University
q. Which time interval should be used for measuring co-contraction index for

osteoarthritic subjects: stance phase or gait cycle?
A Ghazwan, C Wilson, C Avril, H Holt, G Whatling, 2016
62 Annual Meeting of the Orthopaedic Research Society, Florida, USA.
r. The Importance of EMG Normalization When Analysing Muscle Response: A Comparison Study of Different Methods
A Ghazwan, C Holt, G Whatling, 2015
Arthritis Research UK Biomechanics & Bioengineering Centre Site Visit s. Which method of normalization should be used for OA patient?
3 Ghazwan, C Holt, G Whatling, 2015
3rd South West Regional Regenerative Medicine Meeting, Bristol, UK.
t. The importance of knee muscle coordination through different stages of osteoarthritis
A Ghazwan, C Holt, G Whatling, 2015
XXV Congress of the International Society of Biomechanics, Glasgow, UK.
u. Mechanical Analysis of Orthodontic Wires
A Hussein, 2012
Diyala Journal of Engineering Sciences, 5, (01), 172-80
v. The Role of Lubrication Mechanisms in the Knee Synovial Joint
A Yousif, a Hussein, 2008
The First Regional Conference of Engineering Sciences w.
10. Briefly list the most recent professional development activities (if any).

Name: Dr Salman Majid Salman.

2. Education: PhD, Electronic and Electrical Engineering, The University of Sheffield, 2017.
3. Academic experience: Al-Nahrain University/College of Engineering/Biomedical Engineering Department, Lecturer, 2016-now, Full Time.
4. Non-academic experience: None.
5. Certification and professional organizations: None.
6. Current membership in professional organization: None.
7. Honors and Awards: None.
8. Service activities (within and outside of the institution): None.
9. The most important publications and presentations from the past five years:
a. A Polarization Reconfigurable Rectangular Dielectric Resonator Antenna Using PIN Diode For X-Band Applications, AA Soltan, S Khamas, SM Salman, Progress in Electromagnetics Research M, 2023.
b. Design and Implementation of a Sterilizer Box to Stop the Spread of COVIS-19, H Abbas, SM Salman, AF Hussein, M Ali, 2022 4th International Conference on Current Research in Engineering and Science Applications (ICCRESA).
10. Briefly list the most recent professional development activities: Attending several workshops and seminars.

Name: Dr. Samar Ali Jaber

2. Education:
PhD. Medical Engineering / Cardiff University / UK / 2018 MSc. Medical Engineering / Al Nahrain University / Iraq / 2006 BSc. Medical Engineering / Al Nahrain University / Iraq / 2004
3. Academic experience: Lecturer at
- Al-Nahrain University/ College of Engineering/ Biomedical Engineering Department /Baghdad (Iraq)
4. Non-academic experience:
• Technical Manager/ Helm Medical for Medical Equipment and Trading/ Jordan C/O Baghdad/ September 2008 – July 2011
(Job description: Cochlear project manager, Maintenance and warranty program management for Cochlear Speech processors, Management of spare parts selling and delivering process, Intra and post operative NRT and mapping, Senior Clinical Specialist (Helm Medical C/O Larsa Scientific Bureau).)
• Medeical Engineer / Al- Shimmary Group for Trading/ Al-Naseem Scientific Bureau / Al-Mansour/Baghdad / February, 2008 – August, 2008
5. Certification and professional organizations (if any).
• TOT certification /Al-Nahrain University
• 22nd Congress of the European Society of Biomechanics July 2016, Lyon/ France
• The 2nd Workshop on Soft Tissue Modelling 10th-12th June 2015 Glasgow/UK
• Cochlear Distributers Meeting 11th-15th April 2011 Istanbul/Turkey
• Clinical Technical Meeting EMEA Cochlear Academy (Clin-Tech meeting for Nucleus5 Launch) 11th-12th March,2010 Mechelen/Belgium
• Listening to Learn Conference 2010 (Speech Therapy Techniques) 3rd-4th November, 2010 Istanbul/ Turkey
• Clinical Technical Meeting EMEA Cochlear Academy (Clin-Tech meeting for Hybrid Launch) 3rd-4th December, 2008 Mechelen/Belgium
• Clinical Technical Training Middle East2 6th-7th March 2011 Amman/Jordan
• VistafixTM and Baha Training Course 5th-6th October, 2009 Istanbul/Turkey
• Integrity Testing and NRT Training 21st-22nd July, 2009 Istanbul/Turkey
• BSC CRM New Product Training 18th-19th August, 2008 Beirut/Lebanon
• Cochlear Implant (Intra and Post Operative Mapping) 4th-14th September,2008 Amman Jordan

6. Current membership in professional organization :
• Head of (Health and Safety Committee) in the college of engineering/ AlNahrain University
• Head of the Alumni Committee in the Biomedical Engineering Department
• Member of Ethical Committee of Biomedical Engineering Research in ALNahrain Univeristy
• Member of the Exams Committee in Biomedical Engineering Departement
• Member of the Bologna Programme in Biomedical Engineering Department
7. Honors and Awards (if any):
8. Service activities (within and outside of the institution) :
9. Briefly list the most important publications and presentations from the past five years: title, co-authors (if any), where published and/or presented, date of publication or presentation.
• Patient-specific computational fluid dynamics model of Covid-19 adult airway
A Aleigailly, M M.A., S Shaabeth, S S.A, 2023 AIO Conference Proceedings, , 04002e,2804, (1)
• PATIENT-SPECIFIC COMPUTATIONAL FLUID DYNAMICS MODEL OF HEALTHY ADULT AIRWAYS Suaib, M M.A., S Shaabeth, S S.A, 2022 International Middle Eastern Simulation and Modelling Conference 2022, MESM 2022, 50-56
• 2D Mesh Study of Simulated Mechanical Loading on Thoracic Cross-Sectional Image
S Shaabeth, Z Abdeljaleel, 2021 4th International Conference on Bio-Engineering for Smart Technologies (BioSMART), 01-04
• Establishing a Fluid-Structure Interaction Platform for Investigating Infant Cardiopulmonary Resuscitation
S Shaabeth, 2018 Cardiff University
• Biomechanical properties and microstructure of neonatal porcine ventricles
F Ahmad, J Liao, S Soe, M Jones, J Miller, P Berthelson, D Enge, K Copeland, S Shaabeth, R Johnston, I Maconochie, P Theobald, 2018
Journal of the mechanical behavior of biomedical materials, 88, 18-28
• Development of an Infant Heart and Lung FEA Model for Optimizing Cardiopulmonary Resuscitation Performance
P Shaabeth, A Jones, M Jones, S Soe, 2016

22nd Congress of the European Society of Biomechanics, Lyon
10. Briefly list the most recent professional development activities (if any):
• Bio-Ethical course in “Biomedical Engineering Research: Its Importance And Application” within the training program of the continuing education unit at the College of Engineering, Al-Nahrain University
• Bio-Ethical to “Develop A Guide To Ethical Integrity And Its Applications In Biomedical Engineering Research” As part of the training program for the Continuing Education Unit at the College of Engineering, Al-Nahrain University.
• Post-graduation practical life lecture at the College of Engineering, Al-Nahrain University, within the The Station Foundation’s Entrepreneurship Program
• A scientific lecture entitled “Time Management for Organizing and Scheduling Postgraduate Research and Graduation Projects” /College of Engineering /Al-Nahrain University
• A joint scientific workshop with visiting researcher Hannah Safi entitled Cardiovascular Engineering
• Electronic lecture “An overview of Nanotechnology and biomaterials in medicine “

01/28/2021 Electronic lecture in cooperation with Dr. Ihab El-Sharkawy/Egypt to deliver the lecture
• Workshop, “We Put an End to Cancer” 10/23/2019 / College of Engineering, AlNahrain University, in cooperation with the Cancer Council at the Iraqi Ministry of Health, on the occasion of Challenge Month
• A workshop on organizing and writing preliminary studies graduation projects 12/03/2018 / College of Engineering, Al-Nahrain University
• An introductory lecture about the mission to Britain to obtain a doctorate degree 01/11/2018 / College of Engineering, Al-Nahrain University

Name: Dr Dunia Tahseen Nema

2. Education: PhD, Clinical Biochemistery, The University of Baghdad, 2020.
3. Academic experience: Al-Nahrain University/College of Engineering/Biomedical Engineering Department, Lecturer, 1995-now, Full Time.
4. Academic experience: None. Chemistry teacher at Al Wathba Preparatory School for Girls (part time).
5. Certification and professional organizations:-
- Advisory member of the IFAD Scientific Platform
- Diploma in publishing from the IFAD platform
- Diploma in scientific journals and publishing, first and second levels, from Victoria University
- A course on the ECG from the Pulse Foundation in cooperation with Al-Nahrain University
- A course in first aid from the Pulse Foundation in cooperation with Al-Nahrain University

- Patent evaluators course from the Central Organization for Standardization and Quality Control
6. Current membership in professional organization :-
- Member of the Chemists Syndicate
- Member of the Academics Syndicate
7. Honors and Awards :-
None
8. Service activities :-
- Participate in various donation groups
9. The most important publications and presentations from the past five years:-
a. Dunia Tahseen Nema Al-Aridhi, Muthanna Al Quraishi Khalid I.H. Allehibi and ZainabA. Razak Al-Sharifi .2019 . The relationship of serum CyclophilinA level with Glycated haemoglobin and its role in the early prediction of coronary artery disease in Iraqi patients with Type 2 Diabetes … , Annals of Tropical Medicine & Public Health-Special Issues

b. Dunia Tahseen Nema Al-Aridhi, Khalid IH Allehibi, Zainab A Razak AlSharifi, Muthanna Al Quraishi.2020 . Serum Levels of Novel Biochemical
Marker (Irisin) in Relation to the Duration of Type 2 Diabetes & in Cases of Type 2 diabetes with Coronary Artery Disease in Iraqi Patients … , MedicoLegal Update. **Index in Scopus**
c. Dunia Tahseen Nema Al-Aridhi , Muthanna Al Quraishi, Khalid IH Allehibi, Zainab A Razak Al-Sharifi . 2021. Prediction of Coronary Artery Diseaseby Determining Serum /evel of Galectin-3 as a Novel Biochemical MarkeranditsCorrelationwiththe NumberofCoronary Arteries Occlusionin Iraqi …, AIP Conference Proceedings 2372, 030001 (2021). **Index in Scopus**
d. Dunia Tahseen Nema Al-Aridhi, Firas Hassan, Tania T Alaridhi . 2023. Role of Urokinase-Type Plasminogen Activator and Tumor-Associated Trypsinogen in pancreatic cancer metastasis, Journal of Population Therapeutics and Clinical Pharmacology.30 (1):181-185.
e. Abbas Lateef, Anus q. Al-Neami and Dunia T Al-Aridhi . 2023. Review of wireless Polysomnography System, University of Thi -Qar Journal for Engineering Sciences , 13.(1):66-75.
f. Abbas Lateef, Dunia T Al-Aridhi and Anus q. Al-Neami . 2023. Sleep Apnea Detection Methods: A review , Second International Conference on Biomedical Engineering (ICBME 2023).
10. The most recent professional development activities :-
- Member of the editorial board of Al-Kitab Journal for Pure Sciences
1- Name: Dr. Mais Odai Abdul Rassul
2- Education: PhD in Biomedical Engineering from AL-Nahrain University 2021.
3- Academic Experience: lecturer in biomedical engineering department (2010-2024). 4- Non-academic experience: None.
5- Certifications: None
6- Current membership in professional organization: None
7- Honors and awards: Patented in 2018

8- Service activity: None 9- Publications:

- Design of Adaptive State Anstesia Feedback Controler

Faten Imad Ali, Mais Al-Saffar, Noor Ali Sadek, 2023
International Journal of Biomedical Engineering IJOE, 19, (8), 163-174

- Image Based Modelling of Cardiac Mechanics

M Al-Saffar, Z Al-Dahhan, R Al-taweel, 2021
Al-Nahrain Journal for Engineering Sciences NJES, 24, (2), 98-103

- Evaluation of Left Ventricular Mathematical Model for Estimation the Cardiac Mechanics in Heart Failure Patients

M Al-Saffar, Z Al-Dahhan, R Al-taweel, 2021
Intenational Journal of Drug Delivery Technonlogy, 11, (2), 488-495

- Prospective Study on Group of Heart Failure Patients in Ibn Al-Bitar Center for Cardiac Surgery for Evaluation of CRT-D Effect

, M Al-Saffar, Z Al-Dahhan, R Al-taweel, K Sarhan4, 2021
Indian Journal of Forensic Medicine & Toxicology, 15, (3), 1639-1643

- Design an Equivalent Left Ventricular Assist Device for Medical Equipment Labs
H Nazeeh, 2019
Journal of Biomedical Physics and Engineering, 9, (4)

Name: Dr. Jassim Mohammed Sahan

2. Education: PhD, Electronic and communication Engineering, University of Technology, 2022.
3. Academic experience: Al-Nahrain University/College of Engineering/Biomedical Engineering Department, Lecturer, 2014-now, Full Time.
4. Non-academic experience: None.
5. Certification and professional organizations (if any): None.
6. Current membership in professional organization (if any): None.
7. Honors and Awards (if any): None.
8. Service activities (within and outside of the institution) (if any): None.
9. Briefly list the most important publications and presentations from the past five years: title, co-authors (if any), where published and/or presented, date of publication or presentation.
a. "A facial recognition using a combination of a novel one dimension deep CNN and LDA", J Sahan1, E Abbas2, Z Abood3, 2023, Materials Today: Proceedings, 80, (2214-7853), 3594-3599
b. "Implementation of Face Recognition by using of Decision Tree and PART Algorithms Based on LDA" J Sahan1, E Abbas2, Z Abood3, Design Engineering, 2021, (08), 8754-8765
c. Data Mining Approach for Supervised Machine Learning Classification AlgorithmsJ Sahan1, E Abbas2, Z Abood3, 2020 Solid State Technology, 63, (6).
10. Briefly list the most recent professional development activities (if any): None

Name: Dr Basma Abdulsahib Faihan

2. Education: PhD, Biomedical Engineering, Al-Nahrain University, 2023.
3. Academic experience: Al-Nahrain University/College of Engineering/Biomedical Engineering Department, Lecturer, 2013-now, Full Time.
4. Non-academic experience: None.
5. Certification and professional organizations: None.
6. Current membership in professional organization: None.
7. Honors and Awards: None.
8. Service activities: None.
9. Publications and presentations:

a. Non-dispersive infrared CO2 spectroscopy for extracorporeal life support: A digital signal processing design, Basma A Al-Ghali, Ziad T Al-Dahan, Hussein H Alzubeidy, AIP Conference Proceedings, 2023.
b. A study of the dynamic variability of the center of pressure during standing for normal subjects, Basma A AlGhali, Sadiq J Hamandi, Hamza A Fadhil, Badr Rashwani, Cogent Engineering, 2023.
c. Non-Invasive Measurement of Arterial pH During Cardiopulmonary Bypass, Basma A Al-Ghali, Hussein H Alzubeidy, Ziad T Al-Dahan, International Journal of Online & Biomedical Engineering, 2022.
d. A Model-Based Artificial Neural Network to Predict Blood Acidity in Patients under Cardiopulmonary Bypass, Basma A Al-Ghali, Ziad T Al-Dahan, Hussein H Alzubeidy, 2nd International Conference on Computing and Machine Intelligence (ICMI), IEEEXplore, 2022.
e. Non-Dispersive Near Infrared Gas Flow Cell Design for Oxygenator-Exhaust Capnometry, Basma A Al-Ghali, Ziad T Al-Dahan, Hussein H Alzubeidy, NJES, 2022.
f. A suggested design for a tissue level dental implant, Faaiz Y Alhamdani, Basma A Al-Ghali, Asian Journal of Oral Health and Allied Sciences, 2021.
g. Dynamic Analysis of the Gait Cycle for Normal and Abnormal Subjects, Basma A. Faihan Sadiq J. Abass, Al-Nahrain Journal for Engineering Sciences (NJES), 2017.
10. Professional development activities: None.

Name: Dr Muna Mustafa Kareem.

2. Education: PhD, Medical Engineering, University of Glasgow, 2018.
3. Academic experience:
a. Al-Nahrain University/College of Engineering/Biomedical Engineering Department, Lecturer, February 2023-now, Full time.
b. Dijlah University College / Department of Optics Techniques, Lecturer, 2020-February 2023, Full time.
c. University of Glasgow/ Biomedical Engineering Division, Teaching assistant, 2014-2017, Part time.
d. Dijlah University College / Department of Optics Techniques, Assistant Lecturer, 2012- 2014, Full time.
4. Non-academic experience: None.
5. Service activities:

a. Worked as an adult mentor in IYLEP program (Iraqi Young Leaders Exchange Program) funded by the U.S. Embassy in Baghdad. (24th of July- 24th of August 2011).
b. Worked as social media coordinator and Arabic/English translator in YES Academy program (Youth Excellence on Stage) for musicians, composers, and hip-hop dancers which is run by American Voices organization. (1st -12th of July 2012).
c. Worked with "There is Always Hope" group which aims to support children with cancer to fight the disease and recover to have a normal life. (February 2012- February 2014).
6. Briefly list the most important publications and presentations from the past five years: title, co-authors (if any), where published and/or presented, date of publication or presentation.
a. Kareem MM, Hodgkinson T, Sanchez MS, et al. Hybrid core-shell scaffolds for bone tissue engineering. Biomed Mater 2019; 14: 25008.
b. Kareem MM, Tanner KE. Optimising micro-hydroxyapatite reinforced poly (lactide acid) electrospun scaffolds for bone tissue engineering. J Mater Sci Mater Med 2020; 31:4.
c. Kareem MM, Tanner KE. Methods of producing three dimensional electrospun scaffolds for bone tissue engineering: A review. Proc Inst Mech Eng Part H J Eng Med 2022; 236: 483–495.
d. Kareem MM, Kadim MA. Comparison of Central Corneal Thickness Measurements by Ultrasound Pachymetry and Non-Contact Specular Microscopy in Normal Eyes. J Adv Sci Nanotechnol 2022; 1: 47–51.
e. Kareem MM, Kareem AM. Comparing IOP Measurements in the Iraqi Population: Goldmann Applanation Tonometer vs. Topcon CT-80 Air Puff Tonometer. 2023 IEEE Int Biomed Instrum Technol Conf IBITeC 2023 2023;

Name: Dr Hussain Aber Jaber

---

2. EDUCATION

University (Postdoctoral Degree): National Magnetic Resonance Research Center /Turkey
07.2020- 11.2022

University (Doctorate – Ph.D.): Electrical and Electronics Department, Biomedical Engineering program (English)Ankara Yıldırım Beyazıt University, Turkey
09.2015-06.2020 (3.71/4)

University (Master's Degree): Electrical and Electronics Department, Biomedical Engineering program (English)Ankara Yıldırım Beyazıt University, Turkey
09.2013-09.2015 (3.93/4)

University (Bachelor's Degree): Electrical and Electronics Department

09.1992-09.1997	University of Technology, Baghdad/Iraq

3. Academic experience:

Nahrain University-Iraq/ Engineering College/ Biomedical Engineering, (2023- until now):
Alkut University College/Iraq-Alkut(2021-2023)
National Magnetic Resonance Research Center (UMRAM)/ Bilkent University/ Ankara, Research and Development Specialist, (2018- 2023):

- Acquisition of fMRI Data.
- fMRI Data Analysis by using SPM, and FSL.
- Developing the Unsupervised Methods for Analysis of fMRI Data.
- Designing a Paradigm for the fMRI task.
- Designing and implementing a tool for the fMRI data analysis using the clustering method.
- Designing and implementing a tool for the fMRI data analysis using the statistical parametric mapping method.
- Designing and implementing a tool for the fMRI data analysis using a statistical nonparametric mapping method.
- Designing and implementing a tool for the fMRI data conversion and preprocessing processes.

Teaching experiences

- Biomedical Signal Processing
- Biomedical Imaging Processing
- Biomedical Application IN MATLAB
- fMRI Data Analysis
- Machine Learning Algorithm

2

- Unsupervised Learning Clustering Algorithms on fMRI

4. Non-Academic experience:

CCMED Company (Switzerland Company) / Biomedical Engineer/Medical Planning Consultant, 04.2005-01.2013(7 years, 9 months)

¬ The working includes all cities in Iraq – Full Time //Electrical/Biomedical Team Leader.

¬ I worked at CCMED Company as a senior biomedical engineer and medical planning consultant who was responsible for the following:

• I am in charge of a team that is responsible for installing & maintaining the following instruments:

- Clinical Chemistry Analyzer.
- Electrolyte Analyzer Model EX-D.
- Electrophoresis model: A set/ densitron
- Hematology Analyzer. -Sysmex Company
- Coulter Analyzer - Beckman Company.
- Shandon variation 24-4 - Thermo Electron Corporation.

- Shandon Citadel 2000 - Thermo Electron Corporation.
- Coagulation Analyzer Model CA-500.
- Blood Gas Analyzer Model JBA-200.
- Automatic ELISA Machine -Abbott Company.
- Slit Lamp Microscope and Application Tonometer.
- Table-top Centrifuge Model 5200.
- Hematocrit Centrifuge Model 3220.
- ICU Bed.
- Dental Unit - Yoshida Company.
- Central monitor & Bedside monitor - NIHON KOHDEN Company.
- Electrocardiograph & Defibrillator - NIHON KOHDEN Company. Electroencephalograph (EEG- 9200K) - NIHON KOHDEN Company.
- Prosound2 Ultrasound system Aloka Co. Japan
- SSD-500 Ultrasound system Aloka Co. Japan
- Apero MRI Hitachi/ Japan
- Airis MRI Hitachi/ Japan
- Central steam sterilizer - Sakura Company.
- Anesthesia Apparatus - Acoma Company. Lung Ventilator - Acoma Company.
- Infusion pump, Syringe pump, and Nebulizer - Nakamura Medical Industry Co, Ltd.

• I also worked as a site manager in one of thirteen Japanese hospitals in Iraq (rehabilitating thirteen hospitals in Iraq).

• Responsible for developing a work plan and supervision of installation of medical equipment and facility maintenance in 13 hospitals throughout Iraq, work includes:

A. Assessment of existing electrical and mechanical systems and equipment conditions of the hospital as required by the Iraqi Health Ministry.

B. Provide consultation and develop programs for both preventive and routine maintenance cooling /heating systems of the hospital.

C. Perform planning, site design, and installation of medical equipment.

• From 2010 to 2013, I was working as a sales manager.

MDS Company (Jordanian Company)/ Electrical / Biomedical Engineer, 01.1999-03.2005 (6 years, 2 months)

¬ I worked in several hospitals throughout Iraq in the installation and maintenance of medical equipment, and instrumentation provides consultation and advice on the electrical system to operate such equipment.

¬ I am in charge of a team that is responsible for installing & maintaining the following instruments in all hospitals in Iraq:

¬

• Kontron Devices (I had training on them by a trainer from Kontron Company (France company))

- Anesthesia Ventilation- Kontron Company.
- Capnograph- Kontron Company.
- Patient Monitor- Kontron Company.
- Pulse Oximeter- Kontron Company.

• Drager Devices (I had training on them by a trainer from Drager Company (Germany Company))

- Anesthesia machine- Drager Company.
- ICU ventilator- Drager Company.
- Pediatric ventilator- Drager Company.
- Incubator- Drager Company.
- Phototherapy Lamp- Drager Company.
- Oxygen Monitor- Drager Company.

• MMM Devices (I had training on them by a trainer from MMM company (Germany company))

- Vertical steam sterilizer.

• Kretz Devices (I had training on them by a trainer from Kretz Company (Austria Company))

- Ultrasound.

• I am responsible for preparing Biweekly & monthly reports presenting the work done by the team, the working plan for the next month, my recommendations & my conclusions.

• I am also the team leader of Anesthesia equipment (All equipment in the surgery rooms).

• I am also the supervisor of the engineering department of MDS Company from 01/01/2004 till 31/03/2005.

• I was a member of (the Tiger Team), the team organized by CPA/USA, & did the inventory & maintenance of all Iraqi Hospitals, & I have a certificate from CPA/USA for this job.

ALNADA Company (Iraqi Company)/ Consulting/DesignEngineer-private consultation services, 10.1997-01.1999 (1 year, 3 months)

¬ I worked at ALNADA Company as a senior engineer who was responsible for the following:

- Electrical design by using a computer.
- Maintenance of printing machines and accessories. Building internal electrical distribution.
- Build & maintain computer networks (windows 2000 professional, server & advanced server).

- Maintenance & supply of computers. (Repair all computer parts H.D, F.D, CD drive, M.B & Power supply).
- Electronics Workbench.
- E-Mail services.
- MATLAB Applications (designing a Graphical User Interface using MATLAB, Numerical Analysis)
- Windows registry (registry files).
- Structured Cabling system (fiber optical, STP Cable, SFTP & UTP Cable).
- Giving training courses related to various topic related to computers field(such as computers hardware and software, and programming languages)

COMPETENCIES

- MS-Dos, Windows 9XWindows NT, Windows XP, Windows X.
- Microsoft Office (Word, Excel, Access, Word, PowerPoint).
- Microsoft Visual Basic from version 6.0 until the last version. Microsoft Visual Fox Pro 7.0

5

- Build & maintain computer networks (windows 2000 professional, server & advanced server).
- Maintenance & supply of computers. (Repair all computer parts H.D, F.D, CD drive, M.B & Power supply).
- Electronics Workbench.
- Proteus Design suite (ISIS and ARES)
- E-Mail services.
- Matlab application (designing a Graphical User Interface using MATLAB, Numerical Analysis)

- ASP.NET programming.
- Neuroscience applications with MATLAB.
- Medical Devices, Medical Imaging, MATLAB, Data Mining, Clustering Techniques ,
- fMRI Clustering Techniques ,
- SPM Package.
- FSL Package.
- Designing a neuroscience software package

5. CERTIFICATE INFORMATION

• EEG Training Course for providing basic knowledge and Methodological skills to early-career scientists interested in electroencephalogram Aysel Sabuncu Brain Research Center, Bilkent University/Turkey,12.2018.

• A complete Training course that includes the operation, maintenance, and repair of **Steam Sterilizer**
SAKURA SEIKI Co., LTD - 09.2009 in **Japan.**

• **Electrophoresis** Model: A set / DENSITRON 20-HR

Jokoh- CO., LTD - 09.2009 in **Japan.**
• **Electrolyte Analyzer** Model EX-D
Jokoh- CO., LTD - 09.2009 in **Japan.**
• **Blood Gas Analyzer** JBA - 200
Jokoh- CO., LTD - 09.2009 in **Japan.**
• Training course for operation, maintenance, and maintenance for the **Sysmex CA-500**
Sysmex Training Center Corporation - 08.2009 in **Japan.**
• **Technical Training**
Sysmex Training Center Corporation - 08.2009 in **Japan.**
• **Compolyse- 450** clinical Clinical Chemistry Analyzer –service engineering training
Furuna Electric CO., LTD - 08.2009 in **Japan.**
6
• Technical Training course for **Electroencephalograph** (EEG-9200K), **Central monitor** (CNS -9701K), Network for the monitor, **Bedside Monitor** (BSD-2300K), Elect NIHON KOHDEN - 08.2009 in **Japan.**
• Technical Training course for **Central monitor** (CNS -9701K), Network for the monitor, **Bedside Monitor** (BSD-2300K), **Electrocardiograph** (ECG- 1250K), **Defibrillator** NIHON KOHDEN - 10.2008 in **Japan.**
• Training course for operation, maintenance, and repair of medical equipment as follows: 1- **Anesthesia Apparatus** 2- **Lung Ventilator**.
ACOMA Medical Industry Co., LTD - 10.2008 in **Japan.**
• CA- 180 Clinical **Chemistry Analyzer** –service engineering training
Furuna Electric CO., LTD - 10.2008 in **Japan.**
• Technical Training course for **Sysmex CA-500**
Sysmex Training Center Corporation - 10.2008 in **Japan**
• The training course of installation, operation, maintenance, and maintenance for **Sysmex CA- 500**

Sysmex Corporation - 01.2007 in **Japan.**
• Compolyse- 450 clinical Clinical **Chemistry Analyzer** –service engineering training
Furuna Electric CO., LTD - 01.2007 in **Japan.**
• **Electrolyte Analyzer** Model EX-D
Jokoh CO., LTD - 01.2007 i**n Japan.**
• **Blood Gas Analyzer** JBA - 200
Jokoh CO., LTD - 01.2007 in **Japan.**
• Installation, operation, maintenance, and repair of **slit lamp** microscope and tonometer
Inami CO., LTD - 04.2006 in **Japan.**
• Installation, operation, maintenance, and repair of **ICU Bed**
Baramount Bed Co., LTD - 04.2006 in **Japan.**
• Installation, operation, maintenance, and repair of an **Infusion pump**, **syringe pump**, and **nebulizer** Nakamura Medical Industry Co. LTD - 04.2006 in **Japan.**
• **Table-top centrifuge** model 5200 Kubota - 03.2006 in **Japan.**
• **Hematocrit centrifuge** model 3220 Kubota - 03.2006 in **Japan.**
7

• **Electrolyte Analyzer** Model EX-D Jokoh CO., LTD - 03.2006 in **Japan.**
• **Blood Gas Analyzer** JBA – 200 Jokoh- CO., LTD - 03.2006 in **Japan.**
• Compolyse- 450 clinical **Clinical Chemistry Analyzer** –service engineering training Furuna - 02.2006 in **japan**
• windows 2000 MCSE core AL-Tabiaa - 08.2004 in **Iraq**
• Structured cabling system AL-Tabiaa - 08.2004 in **Iraq**
• Fix as much medical equipment as quickly as possible **CPA-MOH** - 11.2003 in **Iraq. TESTS INFORMATION**
• Ankara yildirim beyazit university - 06.2013 English Exam (70)
• IELTS (Intenational English Language Testing System) (6) British Council of Turkey - 06.2013

6. Current membership in a professional organization (if any).

1. Iraq Engineering Union
2. Iraqi Computer Society

7. PUBLICATIONS

[1] Hussain A. Jaber AL-Ziarjawey and İlyas Çankaya, "Heart Rate Monitoring and PQRST Detection Based on Graphical User Interface with Matlab." Abstract Proceedings on 7th International Conference on Computer Science and Information Technology · ICCSIT 2014, Barcelona, Spain, 2014.
[2] Hussain A. Jaber AL-Ziarjawey and İlyas Çankaya, " Heart Rate Monitoring and PQRST Detection Based on Graphical User Interface with Matlab," International Journal of Information and Electronics Engineering V. 5, N. 4, PP. 311-316, 2015.
[3] Hussain A. Jaber AL-Ziarjawey and İlyas Çankaya, "ECG Signal Processing Techniques By Using ASP .Net Application Based on GUI in Matlab", Yıldırım Beyazıt University, Institute of Science, August 2015.

[4] AlJobouri, H. K., Alziarjawey, H. A., & Çankaya, İ. Biosignal Processing and Medical Imaging (BSPMI) Software Package Based on Matlab GUI for Education and Research. Abstract Proceedings on 3rd International Symposium on Engineering, Artificial Intelligence and Applications (ISEAIA 2015), Girne American University, p.39, 2015.
[5] AlJobouri, H. K., Alziarjawey, H. A., & Çankaya İ. Biosignal Processing, Medical Imaging and fMRI (BSPMI) Software Package Based on MATLAB GUI for Education and Research. International Journal of Scientific Research in Information Systems and Engineering, V.1, N. 2, PP. 2380-8128, 2015.
[6] Hussain A. J. Alziarjawey, Hadeel K. Aljobouri, Ünal Çamdalı, İlyas Çankaya, "Design Graphical User Interface of Linear Algebra System Package by Using MATLAB", IJRITCC., V, 4, PP. 428–433, 2016.
[7] Hussain A. Jaber Alziarjawey, Hadeel K. Aljobouri, Sinan Kıvrak, İlyas Çankaya, "Design and Implementation of High Voltage Generator for Medical Applications", International Journal of Science and Engineering Investigations, V. 6, I. 60, January 2017.
[8] AlJobouri, H. K., Jaber, H. A., & Çankaya İ. "Performance Evaluation of Prototype-Based Clustering Algorithms Combined MDL Index." Computer Applications in Engineering Education, Wiley Inc., DOI: 10.1002/cae.21824. 2017.

[9] H. K. Aljobouri, H. A. Jaber, O. M. Koçak, O. Algin, and İ. Çankaya, “Clustering fMRI Data with a Robust Unsupervised Learning Algorithm for Neuroscience Data Mining,” J. Neurosci. Methods, vol. 299, pp. 45–54, Apr. 2018.
[10] AlJobouri, H. K., Jaber, H. A., & Çankaya İ. “Performance Assessment of Unsupervised Clustering Algorithms Combined MDL Index,” DOI: 10.5772/intechopen.74506, Chapter in the Book: Recent Applications in Data Clustering, August 2018.
[11] H. A. Jaber, H. K. Aljobouri, İ. Çankaya, O. M. Kocak, and O. Algin, “VCfMRI: A Matlab Toolbox for Visualization and Conversion of fMRI Data Modalities”, Basic and Clinical Neuroscience. [Online]. Available: http:// http://bcn.iums.ac.ir/article-1-1418-en.html.
[12] H. A. Jaber, H. K. Aljobouri, İ. Çankaya, O. M. Kocak, and O. Algin, “Preparing fMRI Data for Postprocessing: Conversion Modalities,
9
Preprocessing Pipeline, and Parametric and Nonparametric Approaches,” IEEE Access, vol. 7, pp. 122864–122877, 2019.
[13] Hussain A. Jaber, İlyas Çankaya, Hadeel K. Aljobouri, Orhan M. Koçak, Oktay Algin, “Optimal Model-Free Approach Based on MDL and CHL for Active Brain Identification in fMRI Data Analysis,” Current Medical Imaging, volume. 17, Issue 3, Page: [352 - 365], 2021, DOI: 10.2174/1573405616999200730174700.
[14] H. A. Jaber, H. K. Aljobouri, İ. Çankaya, “Optimal Analysis of Functional Magnetic Resonance (FMRI) Using Nonparametric Permutation Method,” Statistical Methods in Medical Research, NeuroQuantology Volume 20, Issue 4, Page: [113 - 127], April 2022, DOI:10.2174/1573405616999200730174700.
[15] H. A. Jaber, H. K. Aljobouri, İ. Çankaya, “Design of a Web Laboratory Interface for ECG Signal Analysis Using MATLAB Builder NE,” Open Computer Science 2022; 12: 227–237, https://doi.org/10.1515/comp-2022-0244.
THESIS:
ECG Signal Processing Techniques By Using Asp.Net Application Based On Gui In Matlab. M.Sc. Thesis. Ankara Yıldırım Beyazıt University, Turkey, 2015.

Name: Reem Shakir Mahmood

2. Education: M.Sc., BioMedical Engineering
3. Academic experience: Al-Nahrain University/College of Engineering/Biomedical Engineering Department, Assis. Lecturer, 2015-now, Full Time.
4. Non-academic experience: None.
5. Briefly list the most important publications and presentations from the past five years: title, co-authors (if any), where published and/or presented, date of publication or presentation.

a. Mahmood, Reem SH, Sadiq J. Hamandi, and Akmam H. Al-Mahdi. "Creating a Digital 3D Model of the Dental Cast Using Structure-from-Motion Photogrammetry Technique." *International Journal of Online & Biomedical Engineering* 19.3 (2023).

b. Mahmood, Reem Shakir, Sadiq Jafer Abbas Hamandi, and Akmam Hamdy AlMahdi. "Create virtual dentoskeletal model by superimposing digital dental cast into cone-beam computed tomography scan." *International Journal of Computer Assisted Radiology and Surgery* (2024): 1-10.
c. Mahmood, Reem SH, Sadiq J. Hamandi, and Akmam H. "Three-dimensional cephalometric analysis of virtual dentoskeletal model." International Journal of Advanced Technology and Engineering Exploration (2024) Vol 11, Issue 111.

Name: Lec. Asst. Noor Ali Sadek.

2. Education: M.Sc., Medical Engineering, Al-Nahrain University, 2012.
3. Academic experience: Al-Nahrain University/College of Engineering/Biomedical Engineering Department, Lecturer assistant, 2016-now, Full Time.
4. Non-academic experience: None. Biomedical engineering at al Kadhymia teaching hospital, 2012-2015, full time.
5. Certification and professional organizations: none
6. Current membership in professional organization: Iraqi engineers' syndicate.
7. Honors and Awards: None.
8. Service activities: None.
9. list of publications:
a. Design of an Adaptive State Anaesthesia Feedback Controller, Faten Imad A. Al-Asfoor, Mais Al-Saffar, Noor Ali Sadek, International Journal of Online and Biomedical Engineering (iJOE), 2023.
10. Briefly list the most recent professional development activities: study PhD in biomedical engineering.

Name: Assistant lecturer Qais Ahmed Habash

2. Education: M.Sc. Biomedical Engineering Department, Al-Nahrain University
Academic experience: Al-Nahrain University/College of Engineering/Biomedical Engineering Department, Lecturer, Full Time.
3. Non-academic experience: None
4. Certification and professional organizations (if any).
5. Current membership in professional organization (if any).
6. Honors and Awards (if any).
7. Service activities (within and outside of the institution) (if any).
8. Briefly list the most important publications and presentations from the past five years: title, co-authors (if any), where published and/or presented, date of publication or

presentation.
a. An adaptive biomedical data managing scheme based on the blockchain technique . Hussein, A.F.; ALZubaidi, A.K.; Habash, Q.A.; Jaber, M.M. 2019. Applied Sciences (Switzerland)
9. Briefly list the most recent professional development activities (if any).

Name: Lect. Faten Imad Ali.

2. Education: MSc, Biomedical Engineering, Al-Nahrain University, 2019.
3. Academic experience: Al-Nahrain University/College of Engineering/Biomedical Engineering Department, Lecturer, 2014-now, Full Time.
4. Non-academic experience: Ministry of Health, Biomedical Engineering, 2011-2014, Full time.
5. Publications
a. Faten E. Ali, Ziad T Al-dahan ,2019, Imaging of occlusal dental decay with 780 nm NIR light, International Journal of Advanced Technology and Engineering Exploration.
b. Hadeel K AlJobouri,,Faten Emad Ali, 2019, Brain-Computer Interface Based on VEP and FMRI Package, American Journal of Biomedical Sciences.
c. Faten Imad Ali, Ziad T Al-dahan, 2020, Teeth Model Reconstruction Based on Multiple View Image Capture, IOP Conference Series: Materials Science and Engineering.
d. Faten Imad Ali, Tariq Emad Ali, Ali H Hamad, 2022, Telemedicine Framework in COVID-19 Pandemic, 2022 International Conference on Engineering and Emerging Technologies (ICEET).
e. Faten Imad Ali, Tariq Emad Ali, Ziad Tarik Al-Dahan, 2023, Private Backend Server Software-Based Telehealthcare Tracking and Monitoring System, International Journal of Online & Biomedical Engineering.
f. Ali FI, Al-Saffar MO, Sadek NA. Design of an Adaptive State Anesthesia Feedback Controller. International Journal of Online & Biomedical Engineering. 2023 Aug 1;19(8).

Name: Hamza Abbas Fadhil.

2. Education: MSc, Biomedical Engineering, The University of Nahrain, 2021.
3. Academic experience: Al-Nahrain University/College of Engineering/Biomedical Engineering Department, Assist Lecturer, 2021-now, Full Time.
4. Non-academic experience: sales engineering @ Almanara Alzarqaa scientific bureau 2019-2020
5. TOT Certificate from Almaarefaa NGO.

6.
A- The Effect of Prosthetic Foot Type on SpatioTemporal Parameters of Unilateral Below-Knee Amputees: A Case Study
H Abbas, S Hamandi, M Abdulsattar, Y Sabeeh, 2021
2020 International Conference on Assistive and Rehabilitation Technologies (iCareTech), 51 – 56
B- Design and Implementation of a Sterilizer Box to Stop the Spread of COVID-19, H Abbas, SM Salman, AF Hussein, M Ali, 2022 4th International Conference on Current Research in Engineering and Science Applications (ICCRESA).
C- A study of the dynamic variability of the center of pressure during standing for normal subjects B AlGhali, S Hamandi, H Rashwani, 2023 Cogent Engineering, Volume 10, 2023 -, (Issue 1)

Name: Assistant Lecturer Doaa Nawfal Hazim.

2. Education: M.Sc., Electronic and Comunications Engineering, Al-Nahrain University 2014.
3. Academic experience:
- Lecturer in Hawler Medical University, College of Nursing, 2015-2016
- Lecturer in Al-Iraqia University, 2017-2018
- Al-Nahrain University/College of Engineering/Biomedical Engineering Department, Assistant Lecturer, 2023-now, 4. Non-academic experience:
- Communication and Broadcast engineer, Iraqi Media Network, Erbil Office, 2013-2015, Full Time.

5. Certification and professional organizations:
6. Current membership in professional organization: None.
7. Honors and Awards: None.
8. Service activities (within and outside of the institution): None.
9. Briefly list the most important publications and presentations from the past five years: title, co-authors (if any), where published and/or presented, date of publication or presentation.
a. “Enhancement Image Quality of CT Using Single Slice Spiral Technique”, Doaa Nawfal Hazim, Dr. Mohammed H. Ali International Journal of Computer Science Engineering and Technology (IJCSET) | February 2014 | Vol 4, Issue 2,44-49.
b. “Tomographic Image Reconstruction Enhancement in Analytical Techniques”, Doaa Nawfal Hazim, Dr. Mohammed H. Ali, Al-Nahrain Journal for Engineering Sciences NJES, 2013.
10. Briefly list the most recent professional development activities: None.

Name: Asst. Lec. Fatima Ibrahim Yasser.

2. Education: MSc, Electronics and Communication Engineering, University of Technology 2021.
3. Academic experience: One year at Al-Shaab University 2022-2023, Al-Nahrain University/College of Engineering/Biomedical Engineering Department, Asst. Lecturer, 2023-now, Full Time.
4. Non-academic experience: None
5. Certification and professional organizations (if any) : None
6. Current membership in professional organization (if any) : None
7. Honors and Awards (if any): None
8. Service activities (within and outside of the institution) (if any) : None
9. Briefly list the most important publications and presentations from the past five years: title, co-authors (if any), where published and/or presented, date of publication or presentation :
a. Fatima I. Yasser a, Bassam H. Abd, Saad M. Abbas, "Detection of confusion behavior using a facial expression based on different classification algorithms.
b. Fatima I. Yasser a, Bassam H. Abd, Saad M. Abbas,"A Review of an Invasive and Non-invasive Automatic Confusion Detection Techniques.
10. Briefly list the most recent professional development activities (if any) : None

Name: Assist. Lec. Abdullah Nasser Ibraheem

2. Education: M.Sc, Electrical and Electronic Engineering, Ankara Yildirim Beyazit University, 2021
3. Academic experience: Al-Nahrain University/College of Engineering/Biomedical Engineering Department, Assistant Lecturer, 2023-now, Full Time.
4. Non-academic experience: NOC Shift team Leader at TASC Towers Iraq, Power provider, Telecom company, 2022 – 2023. 5.
a. Abdullah ALSAQABI, Hüseyin CANBOLAT, "Design and Analysis of High Gain Dual-band Compact Antenna with Fork and Square Slots for Future 5G Technology" 6th International Marmara Sciences Congress (IMASCON Spring 2021), Marmara, Turkey. Proceeding book (189-197). 21 - 22 May (2021) / ISBN: 978-605-70762-0-5

Name: Assistant Lecturer Ahmed Lateef Khudaraham.

2. Education: M.Sc., Electronic and Coomunications Engineering, Al-Nahrain University 2020.
3. Academic experience: Al-Nahrain University/College of Engineering/Biomedical Engineering Department, Assistant Lecturer, 2023-now,
4. Non-academic experience: None.
- NOC Engineer – Ericsson (Zain iq) 2016-2018, Full Time.

- Reporting and Performance Engineer - Ericsson (Zain iq) 2018-2023, Full Time

5. Certification and professional organizations:

- 4G LTE: Technology, Architecture, And Protocols | Udemy
- CDMA, UMTS and HSPA from A to Z | Udemy
- Microsoft Power BI | Udemy
- IP Addressing and Subnetting | Udemy
- GSM Training [2G and 3G] | Ericsson Office, Baghdad
- CCNA 200-125 R&S Certified | CISCO
- NEW_LTE RAN_Basic | Ericsson Academy
- Digital Transformation Mandatory Program 2021 | Ericsson Academy
- MIMO in LTE | Ericsson Academy
- LTE Fundamentals (2016) | Ericsson Academy
- LTE Configuration Overview | Ericsson Academy
- LTE Broadcast Overview | Ericsson Academy
- Introduction to Machine Learning | Ericsson Academy
- Introduction to Artificial Intelligence | Ericsson Academy
- Basics of Power Query | Alison Academy
- Pandas Library in Python Programming | Alison Academy
- Microsoft Power BI for Beginners | Udemy
- Master Microsoft Power BI | Alison Academy
- Microsoft Power BI for Beginners | Udemy
- The Complete Pandas Bootcamp for Data Analysis | Udemy
- Soft Skills: The Ultimate Career Boost | Udemy
- Soft Skills for Professionals | Alison Academy

6. Current membership in professional organization: None.

7. Honors and Awards: None.

8. Service activities (within and outside of the institution): None.

9. Briefly list the most important publications and presentations from the past five years: title, co-authors (if any), where published and/or presented, date of publication or presentation.

a. “A Simple and Compact Dual-Band BPF with High Frequency Ratio to Support Microwave andMillimeter-Wave Applications”, Ahmed Lateef Khudaraham, Dhirgham Kamal Naji, International Journal of Scientific & Engineering Research, 2020.

b. “Design of A Dual-Wide Band BPF Utilizing Parallel Coupled Microstrip Lines and A Centered Arrow-Shaped Resonator”, Ahmed Lateef Khudaraham, Dhirgham Kamal Naji, Al-Nahrain Journal for Engineering Sciences NJES, 2020.

10. Briefly list the most recent professional development activities: None.

Name: Asst. Lec. Zaid Mustafa Khudair.

2. Education: MSc, Electronics and Communication Engineering, Al-Nahrain University 2020.
3. Academic experience: Al-Nahrain University/College of Engineering/Biomedical Engineering Department, Asst. Lecturer, 2023-now, Full Time.
4. Non-academic experience:
a. Drive Test Engineer at Horizon Wave Company (a subcontractor with Ericsson Company) 2015-2017.
b. IOS Applications programmer and developer at Mada Tech. Company 2017-2019.
c. Team Leader and Coordinator at Horizon Wave Company (a subcontractor with Ericsson and Nokia Companies) 2019-2022.
5. Certification and professional organizations (if any) :
a. IOS applications course 2016.
b. Certificate of Employment at Horizon Wave Company 2022.
c. 4G Radio Optimization 2023.
d. 2G and 3G Radio Optimization 2016.
6. Current membership in professional organization (if any) : None
7. Honors and Awards (if any): None
8. Service activities (within and outside of the institution) (if any) : None
9. Briefly list the most important publications and presentations from the past five years: title, co-authors (if any), where published and/or presented, date of publication or presentation :
a. Design and Analysis of a Compact Meander Line Monopole Antenna with Modified Feeding System for CubeSat Satellite. Zaid M. Khudair and Jabir S. Aziz2. Site Press 2020.
b. Design and Analysis of a Compact Meander Line Antenna for CubeSat. Zaid M. Khudair and Jabir S. Aziz2. IJCSET 2020.
10. Briefly list the most recent professional development activities (if any) : None

Name: Assistant Lecturer Arkan Saad Mohammed Raoof

2. Education: MSc, General Material Engineering, The University of Technology, 2019.
3. Academic experience: Al-Nahrain University/College of Engineering/Biomedical Engineering Department, ٢٠٢٣-now, Full Time.
4. Non-academic experience: None.
5. Certification and professional organizations (None).
6. Current membership in professional organization (Iraqi Engineers Union, Iraqi Academics Syndicate, Iraqi Engineers Society and Iraqi Society for Alternative and Renewable Energy Sources and Technology).
7. Honors and Awards (None).
8. Service activities (within and outside of the institution) (None).
9. Briefly list the most important publications and presentations from the past five years: title, co-authors (if any), where published and/or presented, date of publication or

presentation.
- Investigation of mechanical properties of PMMA composite reinforced with different types of natural powders.
- Tin oxide/reduced grapheme oxide hybrid as a hole blocking layer for improving 2D/3D hetrostructured perovskite-based photovoltaics.
- Electron transport layer engineering with rubidium chloride alkali halide to boost the performance of perovskite absorber layer.

10. Briefly list the most recent professional development activities (None).

Name: Assistant Lecturer Enas Shehab Ahmed.

2. Education: Msc, Anatomy &Histology,Baghdad University/college of veterinary medicine
3. Academic experience: Al-Nahrain University/Biotechnology Research Center 2021-now /Biomedical Engineering Department, assistant.Lecturer , Full Time.
4. Non-academic experience: None.
5. Certification and professional organizations : None.
6. Current membership in professional organization : None.
7. Honors and Awards : None.
8. Service activities (within and outside of the institution) : None.
9. Briefly list the most important publications and presentations from the past five years: title, co-authors , where published and/or presented, date of publication or presentation.

- Pre and Postnatal Histomorphological Developmental Studyof the mammary GlandIn Endogenous Rabbits (Oryctolagus Cunculus)
Enas Shehab Ahmed1* and Hadaf H. Mohammed2,2020
- Using of Propolis on the treated rats induced with Polysystic ovarian syndrome by Litrozol drug
E Ahmed1, S Ibraheem2*, H Al-Bari1, 2022
Bulletin of National Institute of Health scienses, 140, (8), 12
- Histomorphological comparative study of the pregnant and lactating mammary gland in endogenous rabbits (Oryctolagus Cuniculus)
E Shehab, H Mhammed, 2022
Journal of Biotechnology Research center, 16, (1), 11
- EFFECT OF ZINC ON HISTOLOGICAL CHANGES AND FERTILITY IN THE TESTIS OF MICE FROM PRE MATURATION UNTIL MATURITY
E Ahmed, 2022
Biochemical and cellularArchive, 22, (1), 5
- Histomorphological developmental study of the stomach in the neonatal and adult mice
Enas Shehab Ahmed1,* Rabab A. Naser2
Jasim Mohammed Abdullah3 , IAR Journal of Agricultural Science and Food Research 2023
- ORGANIC FOOD AND ITS HEALTH BENEFITS FOR HUMANS AND HOW IT DIFFERS FROM

REGULAR FOOD: REVIEW

ENAS SHEHAB AHMED 1, RAWAA ADNAN KHALAF 2, 2024

01 . Briefly list the most recent professional development activities .none.

APPENDIX C – Equipment

Major pieces of equipment used by the program in support of instruction.

Computer Lab

NO	Rig Name	Status
1	Desktop Computer Dell	Valid
2	Desktop Computer Dell	Valid
3	Desktop Computer Dell	Valid
4	Desktop Computer Dell	Valid
5	Desktop Computer Dell	Valid
6	Desktop Computer Dell	Valid
7	Desktop Computer HP	Valid
8	Desktop Computer Dell	Valid
9	Desktop Computer Dell	Valid
10	Desktop Computer Dell	Valid
11	Desktop Computer HP	Valid
12	Desktop Computer HP	Valid
13	Desktop Computer Dell	Valid
14	Desktop Computer Dell	Valid
15	Desktop Computer Dell	Valid
16	Desktop Computer HP	Valid
17	Desktop Computer Dell	Valid
18	Tables	Valid

19	Desktop Table	Valid
20	Chairs	Valid
21	LG Screen	Valid
22	White Board	Valid

Biomechanics Lab

NO	Rig Name	Valid or not
1	AMTI AccuGait force plate	Valid
2	AMTI BP600900 force plate	Valid
3	AMTI OR6-6 force plate	Valid
4	AMTI Accpower force plate	Valid
5	AMTI Force 5 (with hip-spine kit)	Valid
6	AMTI Pin-on-disc	Valid
7	Vickers Hardness tester	Valid
8	Training bicycle	Valid
9	Mg-1908/6 Treadmill	Valid
10	Torsion test	Valid
11	Biomechanical arm simulation device	Valid
12	weight scale sf-400 (1-5000g)	Valid

13	Portable Electronic Scale (0-10 kg)	Valid
14	TGT-300A	Valid
15	Weight and Height Scale 3306 ABV (0-120 kg)	Valid
16	Gunt Humburge f1200 for Photoelasticity	Valid

Medical Devices Lab

NO	Rig Name	Status
1	Spectrophotometer 6715 / Vis.	Working
2	Nd YAG Laser	Working
3	Digital Ultrasonic Therapy Unit	Working
4	Monitor	Consumed
5	Thearacard 400	Consumed
6	Flame Photometer	Consumed
7	NIHON KOHDEN - Celtac - MEK 6410K	Consumed
8	NÜVE - NT 715	Consumed
9	Blood Gases - ESCHWEILER - ECOSYS II	Consumed
10	Micro Centerifuge - MSE	Consumed
11	Digital Storage Oscilloscope - ATTEN	Consumed
12	DAMAC Coulter Counter - DANAM Vector 6	Consumed
13	DC Shock	Consumed
14	KarlStorz - Xenon Light Source 611	Consumed
15	Micrscope - Wetzlar - GERMANY	Consumed

16	Detector Output Measurement Unit	Consumed
17	Automated External Defibrilator	Consumed
18	OPTO - MECHATRONICS OVT. LTD - HOLMARC	Consumed
19	Spectrophotometer - SPECTRONIC 20 - MILTON ROY COMPANY	Consumed
20	FEEDBACK CNC 932	Consumed
21	R.F Oscillator - RIDDE India	Consumed
22	LED SURTRON Touch	Consumed
23	مونتير صالة العلمياتSIRECUST 404N - SIEMENS -	Unknown
24	Electric Sucker - AMEDA egnell Universal	Unknown
25	Infusion Pump System - INFUSOMAT	Unknown
26	Infusion Pump System - IVAC Model 598	Unknown
27	SHANDON VOKAN - 400	Unknown
28	VENTIMETER - AIR SHIELDS - CONTROLLER II	Unknown
29	SERVO Ventillator (900B - SIEMENS ELEMA SWEDISH	Unknown
30	Smart Needle Monitor - PONTIAC - General Hospital 19621	Unknown
31	Cold Light Supply	Unknown
32	Ultrasound System - VOLUSION 5300 - Kretz Technik	Unknown
33	Ultrasound System - Old Version	Working
34	Anesthesia System - Sulla 808	Working
35	Siemens Mobilett II portable X-Ray	Consumed
36	Dental chair- SIRONA C4	Consumed
37	Dental chair - White Color	Consumed
38	Infant Incubator - Atom Infant Incubator - V-85	Unknown
39	KL72001 - Biomedical Measurement System	Working

40	Techbook Scientech / Blood Pressure Measurement	Working
41	Techbook Scientech / Monitor	Working
42	Techbook Scientech / ECG	Working
43	Techbook Scientech / EMG	Working
44	Techbook Scientech / EEGn	Working
45	Techbook Scientech / Pacemaker	Working
46	High Eficiency Filter KY 0003 - Monnal D2	Unknown
47	Spectrophotometer - PERKIN - ELMER	Unknown
48	Ultrsonic Thearpy Unit	Unknown
49	Electro Surgey Unit - ESCHMANN TD311	Consumed
50	LIGHT SOURCE 2150 - DOWNS	Unknown
51	COLD LIGHT FOUNTAIN 485	Unknown
52	Electromyography	Unknown
53	SPIROMETER 1 - CONTEC SP10	Working
54	SPIROMETER 2 - CONTEC SP10	Working
55	Remote ECG Monitor	Working
56	Endoscopy - OLYMPUS LF - 1	Working
57	Endoscopy - OLYMPUS GIF - Type Q20	Working
58	CHEST Spirometry	Unknown
59	Video Graphical Printer - UP 897	Working
60	Video Graphical Printer - UP 890	Working
61	Portable Ultrasound	Working
62	Ultrasound	Working
63	The Ultimate B/W Digital Ultrasound 128 - Medison	Working

64	Desktop Computer - HPLV1911 MONITOR	Working
65	Desktop Computer - Case	Working
66	Desktop Computer - Case	Working
67	Desktop Computer - UPS	Working
68	Laptop DELL	Working

Anatomy Lab

NO	Rig Name	Valid or not
1	Ear model	Valid
2	Teath model	Valid
3	Section veiw of kidney	Valid
4	Ear model	Valid
5	Brain model	Valid
6	Skull model	Valid
7	Teath model	Valid
8	Skull model	Valid
9	Skeleton	Valid
10	left upper limb	Valid
11	Section of the skin	Valid
12	Trunk model	Valid
13	Heart model	Valid
14	model	Valid
15	Elbo joint	Valid

16	sholder joint model	Valid
17	joints	Valid
18	Vertebal model	Valid
19	knee joint	Valid
20	elbo joint	Valid
21	Vertebal model	Valid
22	Vertebal model	Valid
23	Skeleton	Valid
24	Anatomy of the heart	Valid
25	HIP and knee	Valid
26	High Blood pressure	Valid
27	Disorders of the eye	Valid
28	The skin	Valid
29	Bone and joint Diseases	Valid
30	left lower limb	Valid
31	right lower limb	Valid
32	right lower limb	Valid
33	hand	Valid
34	knee joint	Valid

Histology Lab

NO	Rig Name	Valid or not
1	Microscope	Valid
2	Microscope	Valid
3	Microscope	Valid
4	Microscope	Valid
5	Microscope	Valid
6	Microscope	Valid
7	Microscope	Valid
8	Microscope	Valid
9	Microscope	Valid
10	Microscope	Valid
11	Microscope	Valid
12	Microscope	Valid
13	Microscope	Valid
14	Microscope	Valid
15	Microscope	Not valid
16	Microscope	Not valid
17	Microscope	Not valid
18	Microscope	Not valid
19	Microscope	Not valid
20	Microscope	Not valid
21	Micro-hematocrit centirfuge	Valid

22	Over-head	Valid
23	Ultrasonic Cleaner	Valid
24	80-1 Electric Centeifuge	Valid
25	1 Stage Vacuum pump	Valid
26	Heating Mantle	Valid
27	Electronic scale	Valid
28	Hot plate stirrer	Valid
29	Elektronische waage	Valid
30	Electronic scale	Valid

Electrical Lab

NO	Rig Name	Valid or not
1	Digital Multimeter	Not valid
2	DC Power Supply	Valid
3	Function Generator	Valid
4	Oscilloscope	Valid
5	Analog and Digital Laboratory Unit	Valid
6	Analouge Voltmeter	Valid
7	Microprocessor	Valid
8	AKAD Kit	Valid
9	Elettronica Veneta PSU/EV	Valid
10	Insertion Faulty Unit	Valid
11	DC Electrical Circuit Kit I	Valid

12	AC Electrical Circuit II	Valid
13	DC Electronic Device Kit I	Valid
14	AC Electronic Device II	Valid
15	Network Switch	Valid
16	Sniffer Probe Kit PR261	Valid
17	Development Board PIC	Valid
18	Semiconductor Tester	Valid
19	Precision LCR Meter	Valid
20	Spectrum Analyzer	Valid
21	Logic Circuit Board	Valid
22	Bench	Valid
23	Locker	Valid
24	Desk	Valid
25	Desk Chair	Valid
26	Drawer	Valid
27	Components Container	Valid
28	Students Chair	Valid
29	Electrical Heater	Valid
30	Vertical AC	Valid
31	TV	Valid
32	White Board	Valid
33	Plastic Bin	Valid
34	On-wall Mounted Comp. Container	Valid
35	Fire Distinguisher	Valid

36	First Aid Kit	Valid
37	PC	Valid

APPENDIX D – Institutional Summary

The Institution

a. Name and address of the institution:

Al-Nahrain University

Al Jadriyah / Baghdad
P.O. Box: 64074

b. Name and title of the chief executive officer of the institution:

Prof. Dr. Ali Abdul Aziz. Al-Shawi, Chancellor

c. Name and title of the person submitting the Self-Study Report:

Dr. Eman Ghadhban Khalil, BME Department.

d. Name the organizations by which the institution is now accredited, and the dates of the initial and most recent accreditation evaluations:

Al-Nahrain University is not accredited before.

Type of Control

Governmental Control

Educational Unit

College/ Department Overview

The College of Engineering Al-Nahrain University was established in 1988 to be one of the important scientific establishments in this country. It is concerned with the graduation of 9 qualified engineers in the fields of civil engineering, mechanical engineering, Biomedical engineering, Electronic and Communication Engineering, Computer Engineering, Laser Engineering and Optoelectronics, Architecture, Artificial Limbs and Supports Engineering, chemical engineering, Artificial Intelligence and Robotics, and Unmanned Aerial Vehicle, in order to serve the general orientations of the state and society, as well as the preparation of scientific research in all engineering fields to support development plans and ages .

The College has an important role in serving the community through the services provided by the Advisory Office of the College and the training and development courses for engineers and technicians. It relies on the use of mathematics, empirical, scientific, economic, social and knowledge manuals for the invention, Improved structures, machines, tools, systems, components, materials, and processes.

The Department of Biomedical Engineering is one of the important scientific departments in the college. This department was established to meet the needs of the country and maintain efficient engineering cadres for the governmental and private departments of healthcare sector.

Organizational Chart

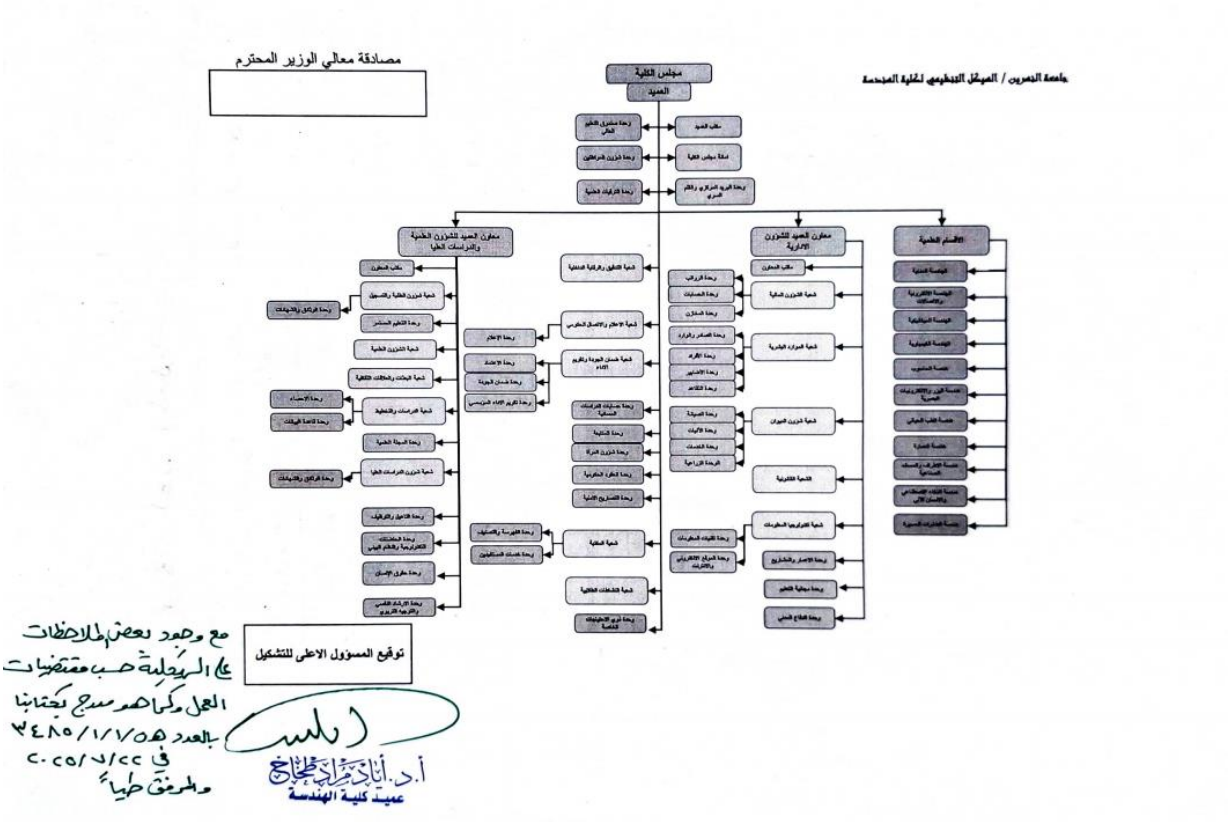

Fig. D-1: Organizational chart showing the location of Biomedical Engineering department among the college of engineering

Academic Support Units

All teaching staff is from BME department, and some courses are taught by faculty from other departments in the college of engineering.

Non-academic Support Units

Department Library:

Department Computing Facilities:

University Career Services:

Department Student Services:

Credit Unit

It is assumed that one semester or quarter credit normally represents one class hour or three laboratory hours per week. One academic year normally represents at least 28 weeks of classes, exclusive of final examinations.

Table D-1. Program Enrollment

BME program

	Academic Year		Enrollment Year					Total Undergrad	Total Grad	Degree Awarded		
			1st	2nd	3rd	4th	5th			BSc	MSc	PhD
Current Year	2024-2025	FT	23	21	34	42	45	165	45	45	10	4
		PT	-	-	-		-	-	-			
1	2023-2024	FT	29	36	39	47	26	117	26	26	16	5
		PT	-	-	-		-	-	-			
2	2022-2023	FT	29	41	48	24	17	159	17	17	14	7
		PT	-	-	-		-	-	-			
3	2021-2022	FT	31	57	23	19	14	144	14	14	11	4
		PT	-	-	-		-	-	-			
4	2020-2021	FT	52	27	18	16	25	138	25	25	17	9
		PT	-	-	-		-	-	-			
5	2019-2020	FT	30	20	18	26	19	113	19	19	10	4
		PT	-	-	-		-	-	-			

FT = Full Time

PT = Part Time

Table D-2. Personnel

BME Program: Year: 2024-2025

	Number		FTE
	FT	**PT**	
Administrative	-	-	
Faculty (permanent staff)	39	-	
Other Faculty (excluding student Assistants)	-	-	
Student Teaching Assistants	-	-	
Technicians/Specialists	1	-	
Administrative Staff	1	-	
Others	-	-	

Submission Compliance and Signature

By signing below, I attest to the following:

That Biomedical Engineering Department/Program has conducted an honest assessment of compliance and has provided a complete and accurate disclosure of timely information regarding compliance with the National Criteria for Accrediting Engineering Programs to include the General Criteria and any applicable Program Criteria, and the National Council Accreditation Policies and Procedures.

Ayad Murad Takhakh, PhD

_____

Dean's Name

Ayad M.

_____ 23-5-2025

Signature **Date**