Ministry of Higher Education and Scientific Research
Scientific Supervision and Evaluation Authority
Quality Assurance and Academic Accreditation Department
Accreditation Division

Guide to Academic Program and Course Description

2025

Academic Program Description Template

University Name: Uruk University
College / Institute: College of Engineering Technology
Department: Medical Instrumentation Engineering Techniques
Academic or Professional Program Name: Bachelor's Degree
Final Degree Name: Bachelor's Degree in Medical Instrumentation Engineering Techniques
Study System: Annual
Date of Preparation of Description: 30-1-2025
Date of File Completion: 8-2-2025

Signature:
Name of Department Head: Dr. Ali Ahmed
Date: 13/5/2025

Signature:
Name of Scientific Assistant:
Date:

File Reviewed by
Quality Assurance and University Performance Department
Name of Director of Quality Assurance and University Performance Department: Dr. Mohammad Sahaa
Date: 13/5/2025
Signature:

Authentication by the Dean: 31/5/2025

الكلية التقنية الهندسية
ا.م.د.علي حسين الحريري
العميد

1. **Program Vision**
   Leadership and excellence in preparing medical device engineers through the provision of high-quality technical education that keeps pace with scientific and technological advancements, contributing to the improvement of healthcare through highly competent graduates and sustainable innovation.
2. **Program Mission**
   To prepare specialized engineering personnel who possess the scientific and practical skills in diagnosing, maintaining, and developing medical devices, with a focus on creativity, adherence to international standards, and strengthening academic and community partnerships to ensure the quality of education and achieve continuous development in the field.
3. **Program Objectives**

• Graduate Specialized Engineering Competencies: Graduates will possess exceptional scientific and practical skills in diagnosing faults and repairing medical devices, enabling them to work efficiently in this vital field.
• Prepare Creative Engineers: Equipped with the ability to keep pace with rapid advancements in the medical device field, while acquiring the necessary skills to continuously develop and update these devices.
• Master Medical Device Installation and Operation: This includes both electronic and electromechanical devices, whether diagnostic or therapeutic, ensuring their optimal performance.
• Effectively Manage Maintenance and Calibration: Contributing to the maintenance of medical devices and supervising the necessary calibration processes to ensure their accuracy and efficiency.
• Design and Develop Alternative Solutions: Finding alternatives for certain parts related to medical devices, enhancing innovation and ensuring the continued excellent performance of the devices.
• Organize and Schedule Maintenance Work: Through programming and systematically managing regular maintenance work to ensure the devices operate at high efficiency.
• Enhance Performance Standards: By applying international standards in technical education and working on improving the quality of academic and professional outcomes.
• Stay Updated with Academic Developments: Regularly updating curricula to ensure students are equipped with the latest knowledge and skills in their field.
• Strengthen Community Engagement: By building strong and sustainable

relationships with various segments of the community to enhance cooperation and promote the academic program.
• Foster Connections with Scientific Institutions: Through continuous communication with local and international scientific institutions to keep up with the latest developments and innovations in the field.

4. **Program Accreditation**

5. **Other External Influences**
   Ministry of Higher Education and Scientific Research, Iraq

6. **Program Structure**

Program Structure	Number of Courses	Credit Units	Percentage	Notes *
Institutional Requirements	2	4	3.05%	
College Requirements	16	42	32.06%	
Department Requirements	21	85	64.89%	
Summer Training	2	No Units		Training for the second and third years
Other				

7. **Program Description**

Year / Level	Course Code	Course Name	Credit Hours	
			Theoretical	**Practical**
First Year	MIT101	Democracy and Human Rights	2	-
	MIT102	Mathematics/1	3	-
	MIT103	Engineering Drawing	-	4
	MIT104	Principles of Electrical Engineering	2	3
	MIT105	Medical Chemistry	2	2
	MIT106	Medical Physics	2	2
	MIT107	Mechanics	2	-
	MIT108	Computer Applications/1	2	2

	MIT109	English Language/1	1	-
	MIT110	Arabic Language	1	-
	MIT111	Workshops	-	4
Second Year	MIT201	Mathematics/2	3	-
	MIT202	Anatomy and Physiology	2	2
	MIT203	Clinical Chemistry Devices	2	2
	MIT204	Electronic Components and Circuits	3	2
	MIT205	Digital Techniques	2	2
	MIT206	Medical Measurements and Transducers	3	2
	MIT207	Medical Devices/1	3	2
	MIT208	Computer Applications/2	2	1
	MIT209	English Language/2	1	-
	MIT210	Systematic Training	-	-
Third Year	MIT301	Medical Electronic Systems	2	2
	MIT302	Digital Signal Processing	2	2
	MIT303	Medical Communication Systems	2	2
	MIT304	Medical Devices/2	3	2
	MIT305	Microprocessor and Computing	2	2
	MIT306	Power Electronics	2	2
	MIT307	Electrical Technology	2	2
	MIT308	Computer Applications	2	1
	MIT309	English Language/3	1	-
	MIT310	Systematic Training	-	-
Fourth Year	MIT401	Medical Devices/3	3	2
	MIT402	Control Systems	2	2
	MIT403	Radiation Devices Engineering	2	2
	MIT404	Medical Laser Systems	2	2
	MIT405	Advanced Digital Design	2	2
	MIT406	Project Management	-	2
	MIT407	Computer Applications	2	1
	MIT408	English Language/4	1	-
	MIT409	Professional Ethics	-	2
	MIT410	Project	-	6

8. Expected Learning Outcomes of the Program

Knowledge		
1	Understanding the fundamental principles of medical device design.	The ability to apply concepts of medical device design and operation in real-world work environments.
2	Acquiring extensive knowledge of biological systems and modern medical technologies.	The ability to comprehend and interpret biological systems and utilize modern medical technologies to enhance healthcare.
3	The ability to analyze medical data and derive conclusions.	The ability to interpret and analyze medical data results and provide precise scientific recommendations.
4	Studying the impact of medical devices on humans and the environment.	The ability to assess the effects of medical devices and propose solutions to mitigate any negative impacts
skills		
1	Developing skills in the use and maintenance of medical devices.	The ability to efficiently maintain and operate medical devices in real-world work environments.
2	The ability to conduct tests and scientific experiments on medical devices.	The ability to design and execute experiments and performance tests for medical devices to ensure their quality.
3	Developing programming and engineering analysis skills for medical devices.	The ability to effectively program and analyze the electronic systems of medical devices.
4	Applying theoretical knowledge to solve practical technical problems.	The ability to utilize skills and theoretical knowledge to solve complex engineering problems in medical devices.
Values		
1	Enhancing ethical and professional values in engineering practices.	The ability to practice medical engineering according to the highest ethical and professional standards.
2	Promoting awareness of the importance of safety and quality in design and maintenance.	The ability to ensure that engineering projects are executed with a focus on safety and work quality.
3	Developing a sense of social and environmental responsibility in engineering work.	The ability to apply engineering solutions that benefit society and preserve the environment.
4	Promoting commitment to ethical and professional standards in engineering projects.	The ability to work in accordance with ethical and professional standards throughout all years of the engineering project.

9. Teaching and Learning Strategies

1. **Faculty Staff**: Use of academically and practically qualified faculty members to deliver high-quality lectures.
2. **Lectures by Faculty Members**: Delivery of theoretical scientific content using innovative educational tools to engage students.
3. **College Library**: Providing scientific sources and academic references to support learning.
4. **Electronic Library**: Enabling students to access scientific references and research journals online.
5. **Textbooks**: Using approved textbooks that provide specialized scientific content aligned with educational objectives.
6. **Supplementary Books**: Providing additional books to support understanding and enhance practical application.
7. **Websites and Internet**: Utilizing the internet and educational websites to support self-research and learning through educational platforms.

10. Evaluation Methods

1. **Continuous Assessment (Formative Assessment)**
2. **Theoretical Tests**
3. **Practical Tests**
4. **Research Projects**
5. **Group Assessment**
6. **Interactive Assessment (Collaborative Assessment)**
7. **Simulation-Based Assessment**
8. **Technological Assessment**
9. **Final Assessment (Summative Assessment)**
10. **Self-Assessment and Peer Assessment**

11. Faculty

Full Name	Academic Title	Specialization		Requirements/ Specific Skills (if any)	Faculty Preparation	
		General	Specialized		Staff	Lecturer
Ali Ahmed Abdul Hamid	Lecturer, PhD	Electrical Engineering	Communications		Staff	
Fadhel Abbas Mahdi Al-Qarmali	Lecturer, PhD	Electrical and Electronic Engineering	Power Electronics		Staff	
Abdul Kareem Abdul Amir Abdul Razzaq	Assistant Professor, PhD	Mathematics	Differential Equations		Staff	
Saja Basim Latif	Assistant PhD	Family Medicine	N/A		Staff	
Hooria Fadhel Abbas	Assistant Lecturer	Master in Control Systems and Networks	Master in Computer Control Engineering		Staff	
Hussein Kasab Hashim	Assistant Lecturer	Physics	Materials Physics		Staff	
Adel Bader Abdul Hussein Al-Riyahi	Lecturer, PhD Engineer	Mechanical Engineering	Engineering Project Management		Staff	
Mazin Shakir Jassim Al-Zayouri	Assistant Professor	Physics	Digital Image Processing		Staff	

Batool Abdul Abbas Hamoud	**Assistant Lecturer**	**Arabic Language / Language**	**Arabic Language / Language / Morphological Semantics**		**Staff**	
Yusra Ra'ed Muhammad	**Assistant Lecturer**	**Physical Sciences**	**General Physics**			**Instructor**
Amna Jawad Kazim	**Assistant Lecturer**	**Chemical Engineering**	**Industrial Units**		**Staff**	
Waleed Hamid Habib	**Lecturer**	**Electrical Engineering**	**Electronic Engineering and Communications**		**Staff**	
Zahraa Shukur Rahimeh	**Assistant Lecturer**	**Techniques of Electrical Engineering**	**Techniques of Electrical Power Engineering**			**Instructor**
Samer Abdul Tarish	**Lecturer, PhD**	**Physics**	**Nanotechnology**		**Staff**	
Zeinab Mohammad Khazal	**Assistant Lecturer**	**English Language**	**Linguistics**		**Staff**	
Mohammed Safaa Al-Din Tahir	**Lecturer, PhD**	**Mechanical Engineering**	**Applied Mechanics**		**Staff**	

12.Professional Development

Orientation for New Faculty Members

The college adopts a comprehensive approach for orienting new faculty members. A thorough orientation program is provided to facilitate their integration into the academic and administrative environment. This program includes focused introductory sessions that familiarize new members with the organizational structure, teaching and learning strategies employed by the college, academic and administrative systems, as well as campus services. Academic mentors are assigned to guide new faculty members individually, focusing on continuous support and answering their inquiries to ensure their swift adaptation to the academic work environment. For visiting and full-time faculty members, detailed information is provided about their expected academic tasks and available resources to ensure the highest levels of success and effectiveness in performing their duties.

Professional Development for Faculty Members

The college aims to enhance the continuous professional growth of faculty members through a comprehensive plan focused on developing teaching strategies, innovating teaching and learning methods, and evaluating learning outcomes in line with the latest global academic trends. The plan includes organizing regular workshops and training courses covering various topics such as improving teaching efficiency, utilizing modern technologies in education, innovative assessment methods, and developing research skills. The college also encourages participation in local and international academic conferences and seminars to promote the exchange of experiences and specialized knowledge. In addition, a comprehensive evaluation mechanism is implemented to assess the performance of faculty members, including feedback from students and colleagues, which contributes to offering tailored training opportunities based on individual needs. In this context, the college ensures to provide a learning environment that supports continuous professional development and contributes to improving academic performance quality.

13. Admission Criteria

The student is accepted into the college through the central admission process of the Ministry of Higher Education and Scientific Research.

14. Main Sources of Information about the Program

1. Faculty staff in the college.
2. Lectures by faculty members.
3. College library.
4. Electronic library.
5. Textbooks.
6. Supplementary books.
7. Websites and the internet.

15. Program Development Plan

1. Presence of E-Learning
2. Training in Hospitals and Medical Equipment Companies
3. Academic Training in Hospitals
4. Preparation of Graduation Projects, Following Up, and Discussing Them in a Manner that Simulates University Theses and Dissertations to Strengthen the Research Skill Aspect of the Student

Program Skills Diagram

Program skills plan															
Education outputs required from the program															
Skills				**Values**				**Knowledge**				Essential or optional	Name of Rapporteur	Symbol of decision	Phase
D4	D3	D2	D1	C4	C3	C2	C1	A4	A3	A2	A1				
			✓	✓	✓	✓	✓		✓	✓	✓	general	Democracy and Human Rights	MIT101	The first
		✓	✓				✓	✓	✓	✓	✓	Assistance	Mathematics and 1	Mit102	
✓	✓	✓	✓				✓	✓	✓	✓	✓	Assistance	Engineering drawing	Mit103	
✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	Specialized	Principles of Electrical Engineering	Mit104	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Assistance	Medical chemistry	Mit105	

✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Assistance	Medical Physics	Mit106	
✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	Assistance	Mechanics	Mit107	
✓	✓	✓	✓			✓	✓		✓	✓	✓	Assistance	Application of Calculation/1	Mit108	
✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	Assistance	English/1	Mit109	
✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	Assistance	Arabic language	Mit110	
✓	✓	✓	✓			✓	✓			✓	✓	Specialized	Workshops	MI111	
	✓	✓	✓			✓	✓	✓	✓	✓	✓	Assistance	Mathematics and 2	Mit201	Second
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Assistance	Anatomy and Philology	MI202	
✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	Specialized	Clinical chemistry devices	MI203	
✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	Specialized	Electronic components and circuits	MI204	
✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	Specialized	Digital technologies	Mit205	
✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	Specialized	Medical measurements and transducers	MI206	
✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	Specialized	Medical equipment/1	Mit207	
✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	Assistance	Applications of Accounting/2	MI208	
✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	Assistance	English and 2	Mit209	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Specialized	Systematic training	Mit210	
✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	Specialized	Electronic medical systems	MIT301	Third
	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	Specialized	Processing of a digital signal	Mit302	

	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	Specialized	Medical communication systems	MI303	
	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	Specialized	Medical equipment/2	MI304	
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Specialized	Processor and accurate calculator	Mit305	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Specialized	Electronic capacity	MIT306	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Specialized	Electricity technology	MIT307	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Assistance	Applications of Calculation	Mit308	
	✓	✓	✓		✓	✓	✓		✓	✓	✓	Assistance	English and 3	Mit309	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Specialized	Systematic training	MIT310	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Specialized	Medical equipment/3	Mit401	Fourth
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Specialized	Systems of control	Mit402	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Specialized	Engineering of radiation devices	MI403	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Specialized	Medical Laser Systems	And MI404	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Specialized	Advanced digital design	Mit405	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	general	Management of projects	And MI406	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Assistance	Applications of Calculation	Mit407	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Assistance	English and 4	Mit408	
✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	Specialized One Semester	Ethics of profession	Mit409	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Specialized	The project	MIT410	

Description of the courses.

1	
1. Course Name or Topic:	Democracy and Human Rights
2. Course Code:	MIT101
3. Semester / Year:	Annual
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	60
7. Course Instructor(s):	
8. Course Objectives: Understanding university student rights and human rights. Differentiating between public freedoms and totalitarianism. Interpreting the concept of totalitarianism in freedoms. Analyzing the protection of rights in democratic systems. Understanding the political foundations of a democratic system.	

9. **Teaching and Learning Strategies**:
   - **Discussion and Comparison-Based Learning**: Enhancing student interaction through the comparison of various human rights concepts and professional ethics across cultures and legal systems.
   - **Problem-Solving-Based Learning**: Analyzing real-world issues in human rights and professional ethics and finding practical solutions.
   - **Research and Application-Based Learning**: Using independent research to apply theoretical concepts to real cases, such as human rights in international or local contexts.
   - **Collaborative Learning**: Encouraging cooperation among students in discussing complex topics and presenting joint projects.
   - **Continuous and Interactive Assessment**: Through class discussions, group work, writing reports and academic papers related to human rights and professional ethics

10. Course Structure

Week	Topics
1	Human Rights in Islam, definitions, and goals. Human Rights in divine religions, especially in Mesopotamian civilization. The character of Prophet Muhammad (PBUH).
2	Human rights in medieval and modern times / Human rights from World War I to World War II. International recognition of human rights in contemporary history and the UN Charter
3	Human rights in the Iraqi constitution and the Universal Declaration of Human Rights (1948), the Arab Charter on Human Rights (1981), the African Charter on Human Rights, the American Convention on Human Rights, the Final Communiqué of the Summit of Supporting Human Rights
4	Human rights at the regional level, the Arab Charter on Human Rights (1994), the Final Communiqué of the Summit of Supporting Human Rights
5	Professional ethics - How to enhance ethical behavior in the workplace according to Kreiner and Kenyki. Key considerations in drafting a professional ethical code. Methods of establishing professional ethics
6	Arab engineers' ethics. Importance of basic elements of the engineering profession's code of ethics. Engineer's relationship with their institution and work.
7	Ethics of engineering practice, specifically for technical engineering colleges. Importance of engineers in society, engineering ethics, and the professional engineer's conditions and characteristics
8	Ethics of medical practice, specifically for health and medical technology students. Characteristics of medical technicians, their duties toward their profession, patients, and society
9	Patient rights, justice and equality, confidentiality, informed consent, and comprehensive care.
10	Professional relationships: The relationship of medical technicians with their colleagues in healthcare institutions. Respect, cooperation, and professionalism
11	Ethics in medical research, ethics of conducting medical experiments in Iraqi health institutions, the Helsinki Declaration on medical experimentation.
12	Human rights in the Iraqi constitution and the Universal Declaration of Human Rights (2005).

13	Guarantees for the respect and protection of human rights at the national level, laws, and constitutional guarantees
14	International human rights protection guarantees. The role of the UN and its specialized agencies
15	Equality, historical evolution of the concept of equality, modern perspectives on gender equality, and national reconciliation.
16	Social and economic freedoms, collective ownership, and social welfare systems.
17	Public freedoms in the developing world and their relation to rights
18	Awareness of water usage in Iraq—past, present, and future
19	Types of democracy: Direct democracy vs. representative democracy.
20	Election methods: direct, indirect, individual, list-based, majority voting, and proportional representation.
25	Election fraud methods
26	Democratic systems in the world and the shift to democracy.
27	Political parties, their origin, and their role in achieving power or participating in governance.
28	Functions of political parties and their impact on democratic transition in Arab countries
29	Traditional functions of political parties in Iraq, and the law regulating them.
30	Political parties and their functions in relation to rights and freedoms in Arab countries.

11. **Assessment Method**: Theoretical exams, reports.

12. **Learning and Teaching Resources:**

Required Books:

- "Human Rights in Islam": A book discussing human rights from an Islamic perspective.
- "Code of Professional Ethics": A book discussing rules of behavior and ethics in various professions.
- "International Human Rights Law": A reference on human rights in an international context.

Main References:

- UN Human Rights Declarations: Including the International Human Rights Charter and global declarations.
- International Charters: Such as the Arab Charter and regional and international agreements.
- The Role of the UN and International Organizations in Human Rights Protection: A study on the role of international bodies in ensuring human rights.

Supporting Resources:

- International Human Rights Journal: Offering research papers on human rights globally.
- Amnesty International Reports: Focusing on human rights violations worldwide.
- Academic journals on professional ethics, such as "Ethics and Professionalism".

Online Resources:

- UN Human Rights Website: Containing materials and research on human rights.
- Amnesty International Website: Providing up-to-date information on global human rights issues.
- Google Scholar: A research platform to access academic papers related to international law and professional ethics.

2	
1. Course Name or Topic:	Mathematics 1
2. Course Code:	MIT102
3. Semester / Year:	Annual
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	90
7. Course Instructor(s):	

8. **Course Objectives**: Understand fundamental mathematical laws. Apply mathematical concepts to solve basic electrical circuit problems. Analyze and simplify mathematical problems related to complex electrical circuits.

9. **Teaching and Learning Strategies**:
   - **Interactive Lectures: Presenting mathematical concepts through theoretical explanations with practical examples.**
   - **Practical Applications: Solving problems and exercises to ensure understanding of concepts.**
   - **Collaborative Learning: Dividing students into groups to solve complex mathematical problems.**
   - **Technology Use: Using simulation programs and mathematical software to clarify concepts.**
   - **Short Tests and Class Discussions: To reinforce understanding and evaluate comprehension.**

10. Course Structure

Week	Topics
1	Limits and theory of derivative. Derivative of trigonometric functions.
2	Chain rules, applications of the derivatives.
3	Derivatives of the inverse trigonometric function.
4	Exponential function and logarithmic function.
5-6	Plane analytical geometry, parabola & ellipse, hyperbola.
7	Polar coordinates.
8	Theory of integrations.
9	The definite and indefinite integration.
10-12	Integral of trigonometric and inverse trigonometric functions, integral of exponential and logarithmic functions.
13-15	Transcendental functions, the trigonometric functions, and inverse trigonometric functions, derivatives of trigonometric and inverse functions, derivatives of the exponential and natural logarithms functions.
16	Hyperbolic and inverse hyperbolic functions with derivatives.
17	Method of integration and numerical integration. Application of the definite integral.
18	Area of surface.
19	Volume of revolution.
20	Length of plane curve.
21	Determinants, properties of determinants, solution of linear equations by Cramer's rule.
22-24	Matrices, inverse of matrix, solution of homogeneous matrices.
25-26	Eigenvalues.
27	Eigenvectors.
28-30	Vector analysis, dot products, cross products.

11. Assessment Method: Theoretical exams, reports.

12. Learning and Teaching Resources

Recommended Textbooks (if available):

- Calculus by James Stewart
- Thomas' Calculus by George B. Thomas
- Advanced Engineering Mathematics by Erwin Kreyszig

Main References (Sources):

- Differential and Integral Calculus by Richard Courant
- Linear Algebra and Its Applications by Gilbert Strang
- Introduction to Real Analysis by Robert G. Bartle

Supporting Books and References (Journals, Reports, etc.):

- Journal of the American Mathematical Society (AMS)
- Journal of Applied and Computational Mathematics
- Research reports on Numerical Analysis and Differential Equations

Electronic References and Websites:

- Khan Academy (www.khanacademy.org)
- MIT OpenCourseWare (ocw.mit.edu)
- Wolfram Alpha (www.wolframalpha.com)

3	
1. Course Name or Topic:	Engineering Drawing
2. Course Code:	MIT103
3. Semester / Year:	Annual
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	120
7. Course Instructor(s):	

8. **Course Objectives**: Master the use of engineering tools for drawing perspectives and projections. Ability to read and design electrical maps, including integrated circuits and electrical motors for buildings and factories.

9. **Teaching and Learning Strategies**:
   - **Interactive Teaching: Using presentations and illustrations to explain concepts.**
   - **Practical Training: Applying engineering drawings using traditional tools and digital software.**
   - **Group Projects: Designing electrical and electronic boards as practical exercises.**
   - **Continuous Assessment: Short quizzes and in-class exercises to monitor student progress.**
   - **Use of Engineering Software: Such as AutoCAD and SolidWorks to enhance skills in engineering drawing.**

10. Course Structure

Week	Topic
1st , 2nd	Introduction
3rd	Lettering
4th , 5th , 6th	Geometrical constrictions
7th	Conic sections
8th , 9th , 10th	Isometric drawing
11th , 12th ,13th	Orthogonal projection
14th	Pictorial projection
15th	Sections
16th , 17th	Explanation & drawing of electric board & electronic symbols
18th , 19th , 20th	Drawing of electric & electronic board
21st, 22nd , 23rd	Integrated circuit drawings
24th , 25th , 26th	Drawing of generator connectors
27th , 28th	Reading different electric & electronic maps
29th , 30th	Industrial drawing

11. Assessment Method: Practical exams, theoretical exams

12. Learning and Teaching Resources

Assigned Books (Curricular) if any:
- **Engineering Drawing and Design** by David A. Madsen
- **Technical Drawing with Engineering Graphics** by Frederick E. Giesecke
- **Electrical Engineering Drawing** by Surjit Singh

Main References (Sources):
- **Blueprint Reading for Electricians** by Rob Zachariason
- **Electronic Drafting and Design** by Howard W. Sams
- **Engineering Graphics Principles with Applications** by James D. Bethune

Supporting Books and References (Scientific Journals, Reports...):
- **IEEE Transactions on Electrical Engineering**
- **ASME Journal of Engineering Graphics**
- **Journal of Engineering Design and Industrial Drawing**

Electronic References and Websites:

- **Autodesk Education Community** (www.autodesk.com)
- **MIT OpenCourseWare - Engineering Graphics** (ocw.mit.edu)
- **IEEE Xplore Digital Library** (www.ieee.org))

4	
1. Course Name or Topic:	Principles of Electrical Engineering
2. Course Code:	MIT104
3. Semester / Year:	Annual
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	150
7. Course Instructor(s):	

8. **Course Objectives**: Understand the basic electrical calculations in circuits with alternating and direct current. Familiarize with the different theories used to study and analyze electrical circuits. Apply theoretical and practical calculations in analyzing electrical circuits

9. **Teaching and Learning Strategies**:
   - **Interactive Lectures: Explanation of laws and basic concepts with practical examples.**
   - **Practical Applications: Conduct laboratory experiments on electrical circuits to understand theories.**
   - **Problem-Based Learning: Analyzing complex electrical circuit problems and providing innovative solutions.**
   - **Computer Simulation: Software such as Multisim and MATLAB to simulate circuit operations.**
   - **Group Projects: Design and analysis of real electrical circuits to enhance students' skills.**

10. Course Structure

Week	Topic
1st , 2nd	Symbols and abbreviations, Units, Electric circuits and its elements. Ohm's law, resistance in series & parallel
3rd , 4th	The direct – current network (Kirchoff's law & their use in network)
5th , 6th	Conversion of delta – connected resistance into an equivalent Wye connection & Vic versa
7th	Power sources connected in parallel, Node voltage method
8th , 9th	Loop current method
10th , 11th	Superposition method, Thevenin theorem, Norton theorem
12th , 13th	Non-linear direct current circuit, Diode circuits
14th , 15th	RL transient circuits
16th , 17th	RC transient circuits
18th	Generation of alternating current, Sinusoidal current
19th , 20th	The mean values of current and voltage
21st	The effective values of current and voltage
22nd	The vector diagram, Phasor diagram, RL, RC, RLC
23rd	The instantaneous power and mean power of A.C, relative and apparent power
24th , 25th	3-Phase system, Wye connection
26th , 27th	Delta connection
28th , 29th	The power in balanced three-phase circuits
30th	Unbalanced Wye & delta connected load, the rotating magnetic field

11. Assessment Method: Practical exams, theoretical exams, reports

12. Learning and Teaching Resources

Recommended Textbooks (if available):

- Fundamentals of Electric Circuits by Charles K. Alexander & Matthew N. O. Sadiku
- Electrical Circuits by James W. Nilsson & Susan Riedel

- Introductory Circuit Analysis by Robert L. Boylestad

Main References (Sources):

- Electric Circuits and Networks by K. S. Suresh Kumar
- Basic Electrical Engineering by D. P. Kothari & I. J. Nagrath
- Principles of Electric Circuits: Conventional Current Version by Thomas L. Floyd

Supporting Books and References (Journals, Reports, etc.):

- IEEE Transactions on Circuits and Systems
- Energy and Electrical Systems Engineering Journal
- Research reports on electrical circuits and electronic control

Electronic References and Websites:

- Khan Academy - Electrical Engineering (www.khanacademy.org)
- MIT OpenCourseWare - Circuits and Electronics (ocw.mit.edu)
- All About Circuits (www.allaboutcircuits.com)

5	
1. Course Name or Topic:	Medical Chemistry
2. Course Code:	MIT105
3. Semester / Year:	Annual
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	120
7. Course Instructor(s):	

8. **Course Objectives**: Understand the relationship between chemistry and physics and the laws derived from them. Study the states of matter and methods of transformation between them, with emphasis on the properties of each state. Analyze energy conversion processes into work and vice versa. Understand and study the heat generated by chemical reactions.

9. **Teaching and Learning Strategies**:
   - **Interactive Lectures: Clarify basic concepts using presentations and illustrative experiments.**
   - **Practical Applications: Conduct laboratory experiments in quantitative and qualitative analysis to clarify theoretical principles.**
   - **Problem-Based Learning: Use analytical problems that require critical thinking and scientific inferences.**
   - **Use of Modern Technology: Apply analytical simulation programs such as ChemDraw and Labster.**
   - **Continuous Assessment: Short quizzes, presentations, and data analysis exercises to track understanding progress.**

10. Course Structure

Week	Topic
1st	Introduction to analytical chemistry. Qualitative analytical chemistry. Quantitative analytical chemistry.
2nd	Applications of quantitative analysis. First steps in making analysis.
3rd , 4th	Methods of Expressing analytical concentrations: Normality, Formality, Molarity.
5th	Mole fraction, Mill equivalent.
6th	Volumetric analysis: principles, standard, solution.
7th	Classification of volumetric methods.
8th	Acid-Base indicators, buffer solution.
9th	Precipitation reaction, the pH scale.
10th , 11th	Gravimetric analysis, calculations.
12th	Solubility of precipitations.
13th	Errors & treatment of analytical data: sources of errors, determinate errors, indeterminate errors, average, mode, range, median.
14th	Average derivation, standard deviation, variance, method of expressing accuracy.
15th , 16th	Absolute error, relative error, rejecting of experimental results.
17th	Reversible and irreversible expansion.
18th	Heat capacities, adiabatic expansion.
19th , 20th	Second law of thermodynamics: spontaneous processes.
21st , 22nd	Carnot cycle, entropy.

23rd , 24th	Electrochemistry: electrochemical cells, types of electrodes, electrolytes.
25th	Electromotive force.
26th	Nernst equation, cell potential.
27th	Photochemistry (spectrophotometer analysis). Regions of electromagnetic spectrum.
28th	Absorption and emission of electromagnetic spectrum.
29th	Beer-Lambert law instrumentation.
30th	Components of spectrophotometer. Analysis by spectrophotometry.

11. Assessment Method: Practical exams, theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):

- Fundamentals of Analytical Chemistry by Douglas A. Skoog, Donald M. West
- Quantitative Chemical Analysis by Daniel C. Harris
- Principles of Instrumental Analysis by Skoog & Holler

Main References (Sources):

- Analytical Chemistry: A Modern Approach to Analytical Science by Kellner, Mermet
- Electrochemical Methods: Fundamentals and Applications by Allen J. Bard
- Thermodynamics and Chemistry by Howard DeVoe

Supporting Books and References (Scientific Journals, Reports...):

- Analytical Chemistry Journal published by the American Chemical Society
- Journal of Electroanalytical Chemistry
- Scientific reports on spectrophotometry and electrochemical analysis

Electronic References and Websites:

- MIT OpenCourseWare - Analytical Chemistry (ocw.mit.edu)
- Royal Society of Chemistry - Analytical Methods (www.rsc.org)
- NIST Chemistry WebBook (webbook.nist.gov)

6	
1. Course Name or Topic:	Medical Physics
2. Course Code:	MIT106
3. Semester / Year:	Annual
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	120
7. Course Instructor(s):	

8. **Course Objectives**: Understand the physical phenomena related to the human body. Deal with medical devices related to these physical phenomena.

9. **Teaching and Learning Strategies**:
   - **Interactive Lectures: Explain the physical concepts related to the human body with direct medical applications.**
   - **Practical Experiments: Use medical physics laboratories to study the effects of heat, pressure, and electricity on the body.**
   - **Problem-Based Learning: Study medical cases that require a physical understanding to solve.**
   - **Computer Simulation: Use simulation programs for biological systems such as circulation and respiration.**
   - **Projects and Scientific Reports: Analyze medical devices and their roles in diagnosis and treatment.**

10. Course Structure

Week	Topic
1st	Forces on and in the body.
2nd	Physics of the skeleton.
3rd	Heat & cold in medicine.
4th	Energy, work and power of the body.
5th	Pressure in body organs.
6th	Physics of the lungs and breathing.
7th , 8th	Physics of cardiovascular system.
9th , 10th	Physics of urinary system.
11th , 12th	Instrumentation related to the respiratory, cardiovascular, and urinary systems.
13th , 14th	Electricity within the body.
15th , 16th	Applications of electricity and magnetism in medicine.
17th , 18th	Sound in medicine and physics of hearing.
19th , 20th	Light in medicine and physics of vision.
21st , 22nd	Diagnostic X-rays.
23rd , 24th	Physics of nuclear medicine (radioisotopes in medicine).
25th , 26th , 27th	Physics of radiation therapy.
28th, 29th 30th	Radiation protection.

11. Assessment Method: Practical exams, theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):

- Medical Physics by John R. Cameron & James G. Skofronick

- Introduction to Physics in Modern Medicine by Suzanne Amador Kane
- Physics of the Human Body by Irving Herman

Main References (Sources):

- Biomedical Physics by David Dowsett
- Radiologic Science for Technologists by Stewart C. Bushong
- Fundamentals of Radiation Dosimetry by Attix Frank H.

Supporting Books and References (Scientific Journals, Reports...):

- Medical Physics Journal
- Physics in Medicine and Biology Journal
- Reports from the International Atomic Energy Agency on Radiation Protection in Medicine

Electronic References and Websites:

- MIT OpenCourseWare - Medical Physics (ocw.mit.edu)
- International Atomic Energy Agency (IAEA) - Radiation Protection (www.iaea.org)
- Radiopaedia - Medical Imaging Physics (www.radiopaedia.org)

7	
1. Course Name or Topic:	Mechanics
2. Course Code:	MIT107
3. Semester / Year:	Annual
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	60
7. Course Instructor(s):	

8. **Course Objectives**: Acquire the theoretical knowledge required to solve technical problems. Apply mechanical concepts in the design and construction of machines and devices

9. **Teaching and Learning Strategies**:
   - **Problem-Based Learning: Study real-world mechanical problems such as structure design and force calculations.**
   - **Practical Experiments in Labs: Conduct experiments on various components and test how forces affect them.**
   - **Project-Based Learning: Apply mechanical concepts in the design and analysis of structures and components.**
   - **Group Discussions: Exchange views on engineering problems and various solution methods.**
   - **Use of Engineering Software: Training on software such as AutoCAD and ANSYS for force and stress analysis in materials..**

10. Course Structure

Week	Topic
1st	Introduction, resultant of force system.
2nd	Component of force.
3rd	Moment of force.
4th , 5th	Couples, resultant of coplanar force systems.
6th , 7th	Equilibrium of force system.
8th , 9th	Non-coplanar force systems, equilibrium of non-coplanar concurrent force.
10th , 11th	Analysis of structures.
12th , 13th	Methods of joint problems.
14th , 15th	Friction.
16th , 17th	Centroid.
18th , 19th	Second moment of area.
20th	Material properties.
21st , 22nd	Stresses.
23rd	Simple strain.
24th	Variable stresses.
25th , 26th	Bending & beams.
27th , 28th	Riveted and welded connections.
29th , 30th	Special topics.

11. Assessment Method: Theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):

- Engineering Mechanics: Dynamics and Statics by J.L. Meriam & L.G. Kraige
- Mechanics of Materials by R.C. Hibbeler
- Strength of Materials by Ferdinand P. Beer

Main References (Sources):

- Advanced Mechanics of Materials by Arthur P. Boresi
- Introduction to Solid Mechanics by Irving H. Shames
- Statics and Mechanics of Materials by R.C. Hibbeler

Supporting Books and References (Scientific Journals, Reports...):

- Journal of Applied Mechanics
- International Journal of Solids and Structures
- Technical reports on materials testing and structural mechanics

Electronic References and Websites:

- MIT OpenCourseWare - Solid Mechanics (ocw.mit.edu)
- Engineering Toolbox - Material Properties (www.engineeringtoolbox.com)
- Coursera - Mechanics of Materials (www.coursera.org)

8	
1. Course Name or Topic:	Computer Applications/1
2. Course Code:	MIT108
3. Semester / Year:	Annual
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	120
7. Course Instructor(s):	

8. **Course Objectives**: Provide students with theoretical and practical knowledge regarding hardware and software in computing, and introduce students to different operating systems.

9. **Teaching and Learning Strategies**:
   - **Project-based learning: Students are encouraged to complete practical applications, such as creating files or editing text, to deepen their understanding.**
   - **Hands-on practice: A combination of theoretical lectures and direct application exercises to more effectively acquire skills.**
   - **Problem-solving-based learning: Presenting technical problems for students to analyze and solve using appropriate tools and programs.**
   - **Collaborative learning: Encouraging group learning by working on small projects or discussing solutions to computing problems.**
   - **Inquiry-based learning: Motivating students to search for information from the internet or other sources to enhance their ability for self-learning.**

10. Course Structure

PART 1: Computing Fundamentals		
week	**Theoretical Details**	**Practical Details**
1	**Operating systems** what is an operating system and what it can do, types of operating systems the features importance (95, 97, 2000, Me, XP, Vista, 7, 8, 8.1, and 10) and their characteristics; explain the differences between operating systems and software applications; computer power on/off; using mouse and their buttons.	Display operating systems basics, shutdown computer, log off, log on, restart, sleep, using mouse (pointing, selecting, dragging, and execution).
2	**Looking at the desktop**: navigation on desktop; using start button; working with application; using taskbar; understanding software and hardware (their differences, importance and relationships); explain why hardware can influence the operating system and software and vice versa; software updates, security and bugs; software ethics.	Using desktop, moving around the desktop, and using the main application icons, using start button; application programs (install, open, close, and uninstall).
3	**Files and folders** looking at typical window, moving, and sizing window. Using scroll bar, understanding and using to my computer and recycle bin. concepts of drives, folders, and files (differences and importance); Directory and folder hierarchy and structure; understanding file name and common extensions.	Looking at window (details, title bar, Tools bar, address bar, status bar and Windows's content) expand and collapse and close window; moving and resizing window.
4	**Folder and file management** (Create, copy, cut, delete, rename, find, and move); common keyboard shortcuts, undelete folder and files using recycle bin, display the differences between uninstall and undelete or delete.	Working with Drive, folders and files using listed operation; using shortcuts (ctrl + C, + V, + A, + S… etc.) restore folders or files
5	**Computer hardware** identifying computer (mainframe, super computers, mini computers, desktop, notebooks, laptop, tablet, PCs, servers, Hand held or mobile computers; Music on Media players and Electronic book readers).	Identify the hardware and explain the different types of computer using illustration or what provided by internet.

6	**Looking inside a computer** (microprocessor, system memory, storage systems) recognizing input/output devices (using keyboard, pointing devices, microphones, monitor, printers, projector, and speakers) **understanding how it works together**.	Explain microprocessor chip, types of memory (RAM, ROM, and SSD drive) memory units of measurement, devices how to use keyboard, mouse pointers, and other peripherals; 76identifying motherboard and their parts, how to use computer resources.
7	**Using control panel** customizing desktop and display, changing date and time, changing language, accessibility settings.	Identifying the control panel icon, changing desktop icon, wallpaper, display type and size, setup time and date, using language options, using accessibility.
8	**Understanding power options** (shutdown, sleep, Hibernate), Working with all settings working with power settings identifying need of operation safe mode and normal mode understanding user accounts and rights create new user account, change in controls; rights and access).	Power off computer using different options; understanding the mode of operation; create user account; log off ;log on ; changing accounts
9	What is software (Checking system requirements, and hardware implications); application software; integrated sheets; desktop publishing; spreadsheet; database management; presentation; Art; Engineering; mathematics; statistics; medical; management; content creation; multimedia; entertainment; system protection) management software (install a new one, uninstall, reinstall, and updating software)	Understanding the application software types and their usage, how to install and uninstall, programs and display the differences from delete, update reinstall the software
10	Disk management programs (disk cleanup, check, optimize, and compression) what is troubleshooting? managing hardware/software; keep copies of data; dealing with viruses, malware and Trojans, getting Windows help and support	Delete systemically unnecessary files, scan disc, defragment disc, compress disc, understand the most common troubleshooting of computer or software.
PART 2: Key Applications (office 2013 or 2010)		
Week	**Theoretical Details**	**Practical Details**
11	**What is key applications** what it can do?; getting started (start and exit program), looking at the main screen (for Word, Excel, and PowerPoint), accessing commands and characteristic features, understanding ribbon; tabs; status bar; scroll bar; create files from templates, how to get help, manipulation files and data exchange.	Starting each program and identify the main screen in details as title bar, main ribbon and their tools, formula bar in Excel, Windows content, status bar …etc.
12	**Microsoft Word** entering and editing text (using editing keys), writing in Arabic and English; changing option, using roller, move around the document, selecting text (word, line, paragraph, pages, and all pages) save; close; open documents; customizing view, edit text using (redo, undo, cut, copy, and paste) formatting text using font command, paint brush, and alignment types, spell check and correction.	Writing text with some wrong words and different formatting types to perform the task of this lesson.
13-14	Understanding and working with indents, organizing lists, working with paragraphs, line space, set paragraph space, working with style, and using quick Styles, finding and replacing items, document formatting, page background and watermark, learn how to write Arabic in English Direction, and write English word in Arabic Direction.	Indent text by hanging the main paragraph body lines, line space types, find and replace text, find and replace using formatted text, add background to watermark, add different styles for word and pages.

15	**Page setup** (change paper size, orientation, margins) insert page breaks, adding page number or titles, applying columns and how to use it, preview and print documents, using multimedia files (insert images, objects) and manipulating them, using tables (create new one insert Excel table selecting items in the table and formatting tables.	Insert page number and/or images, clipart, Excel sheet, create tables, change column size, adding row, formatting tables.
16	**Microsoft Excel:** understanding basic terminology (worksheet, work file, Cell, cell pointer, cell content, row and column reference) building formula, mathematical operations, hierarchy of the main mathematical operations, management workbooks (create new one, create from template, enter data, moving around, saving, and closing workbooks.	Work with the principles of Workbook and worksheet and their contents; working with mathematical operators; create worksheet, using templates; show the different types of data; save works, closing Workbook or closing programs, moving around the main Excel window.
17	Manipulating the contents (selecting cells; columns; rows; worksheet, using undo and redo, copying and moving data, changing column width and row height); auto filling technique; deleting and editing content; delete and insert row or column; formatting cells (number; font; alignment; border; color, and shading; protection of cells and worksheet)	Changing content, autofill data; manipulating worksheet and data, using the different option of formatting cell.
18		
19	**Creating simple and complex formula** using different types of writing, using absolute and relative address, understanding coming error values; using common built-in functions (sum, average, Max, min, count, count a, count blank, if, round, Sqrt, today, Day360, left, right, mid, trim) copying formulas; inserting and deleting worksheets; formatting tables using auto format.	Writing different types of formulas, copy formulas, understand the difference between absolute and relative cell, identify around values, use common built-in functions, customizing tables, managing sheets.
20	**Working with charts** (create chart, select chart elements, changing chart types, positioning, and resizing charts, chart and Excel titles) changing background and color effects, changing data series color, adding or removing Legend and data labels and data tables and gridlines); sorting data ascending and descending, sorting multiple Fields, faltering data using Auto and customized type; customizing printout using options, previewing and printing worksheet.	Build different types of chart; customizing their subject; both database table, sort data, filter data, print database table or chart; changing print options.
21	**Understanding PowerPoint** and the presentation; what does a presentation include; working with presentations (creating, saving, closing, or opening presentations); moving around in presentation, managing the slides (inserting; deleting; rearranging slides, changing layout, changing or modifying themes.	Create presentations, create using templates, insert slide, change slide layout, save work.
22	**Managing slide objects** (using select vs edit mode; manipulating text; create tables and charts; inserting pictures or clip art or multimedia); creating a master slide; animating objects (customizing the animation, applying slide transitions); running the slideshow and set up the presentation, previewing and printing presentation.	Open preview work, insert image, clipart, worksheet, sound, video as you need, puts transition time within a slide and transition time between slides, run slideshow.
PART 3: Living Online		
week	**Theoretical Details**	**Practical Details**
23	**The internet browsers and the world wide web** (the internet, the world wide web, web browsers); understanding website address (website protocols, resource names)	Exercise of checking connection of your computer system to the internet, and use a simple utility (Ping request) to test whether your internet connection is functional or not; open website of different domains (.Net, .Org, .com, .edu)

24	**Common website/page elements**; browser features and functions (Browser functions, browser features); getting connected; defining network; advantages of using networks; understanding local area network (LAN), and wide area network (WAN); connected to the internet (dial-up connection, Direct connection); domain and subdomain, needs for security and firewalls.	Open different web browsers (Internet Explorer, Firefox, Google Chrome and others) explain their function (**addressing, uploading, and downloading, and searching**) and features (**back, forward, and refresh buttons, home page, tabs favorites/bookmarks, checking the history, plug-ins/add-ons**); connect to the Internet; identifying networks and their types.
25	**Digital communication** how can I communicate with others? (electronic mail, instant messages, text messages, VoIP, video conferencing, chat rooms, social networking sites, blogs, presence and the standards for electronic communication)	Exercise of creating email (Google mail, Yahoo mail); Social network accounts (Facebook and Twitter); blogs; and others. Sending text message using Facebook messenger, Skype and other. Perform other activities in social networks (**status, privacy, and security**)
26	**Working with email** (usernames, passwords, and credentials)	Explore email properties: security (password, password recovery information, and alternative e-mail), sending e-mail (To, CC, BCC, and subject), attaching files to email, boarding contacts list and others.
27	**Using Microsoft Outlook:** (creating new messages, receiving messages, working with attachments, managing spam, emptying the junk e-mail folder, automating outlook)	Sending email using Outlook (with exploring all properties above)
28	**Digital citizenship** identifying ethical issues (understanding intellectual property, copyright and licensing); protecting your data or computer (identifying software threats, understanding viruses), protecting yourself while online; buying online; how much information should I share? protecting your privacy)	Try to make strong password try; to remove files without recoverable ability (example: CCleaner, free application)
29	**Finding information** searching for information (different types of websites, searching a specific website); using search engine technology (understanding how search engines work)	Try web search for certain keywords using different search engine (example: Google, Bing); also search multimedia files (pictures, audio, or video) and specialized search engine (example: flickr.com, youtube.com)
30	**Narrowing the search:** evaluating information (reliability and relevance, validity and authenticity, objectivity and bias)	Find specific and accurate information using Google (reduce number of keywords, use quotation marks, used OR search within certain site, and others)

11. Assessment Method: Practical tests, Theoretical exams, reports

12. Learning and Teaching Resources

PART 1: Computing Fundamentals:

Required books: Operating Systems and Basic Computing Concepts.

Main references: Computer components, file management, operating system manuals.

Additional references: Articles on operating system developments and data management.

Online resources: Official operating system sites, technical forums, Wikipedia.

PART 2: Key Applications:

Required books: Microsoft Office (Word, Excel, PowerPoint) guides.

Main references: Official user guides from Microsoft, specialized books on word processing and spreadsheets.

Additional references: Online tutorials, tech magazine articles on office software.

Online resources: Coursera, Udemy, and YouTube tutorials for Microsoft Office.

PART 3: Living Online:

Required books: Books on the internet and networking basics.

Main references: Academic books on networks, cybersecurity, and internet protocols.

Additional references: Articles on internet advancements, digital communication, and information security.

Online resources: Khan Academy, Google and Microsoft documentation on browsing and network security.

9	
1. Course Name or Topic:	English Language/1
2. Course Code:	MIT109
3. Semester / Year:	Annual
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	30
7. Course Instructor(s):	

8. **Course Objectives**: Learn and use new vocabulary related to various topics. Understand and use different tenses such as the simple and continuous present, simple and continuous past. Correctly use grammar rules, form questions and negatives, and use possessive forms

9. **Teaching and Learning Strategies**:
   - **Active Learning: Encouraging students to actively engage in their studies through group discussions, problem-solving, and presentations.**
   - **Project-Based Learning: Assigning academic projects related to the topics studied, helping students apply theoretical concepts in practical contexts.**
   - **Using Technology in Education: Integrating electronic resources such as videos, online lectures, and digital materials to enhance understanding.**
   - **Continuous Assessment: Regularly assessing students through short tests, group discussions, and report writing to ensure progress in the content.**
   - **Collaborative Learning: Group work among students to foster collaboration and solve academic challenges collectively.**

10. Course Structure

Week	Topic	Details
1st, 2nd	Introduction to Academic English	Basic vocabulary, fundamental reading and listening skills, basic sentence structures.
3rd, 4th	Basic English Grammar	Verb tenses, sentence structures for academic writing.
5th, 6th	Academic English for Scientific Research	Writing research introductions, learning research-related vocabulary.
7th, 8th	Basic Medical Terminology	Learning medical and technical terms related to biomedical devices, talking about medical tools.
9th, 10th	Academic Writing and Reports	Writing short technical reports, using academic vocabulary in reports.
11th, 12th	Presentation and Speaking Techniques	Academic speaking skills, preparing and presenting engineering-related presentations.
13th, 14th	Understanding Videos and Technical Lectures	Improving listening skills, learning technical vocabulary.
15th, 16th	Discussion and Academic Exchange	Group discussions, preparing questions on engineering topics.
17th, 18th	Technical Writing and Experiment Explanation	Writing reports on engineering experiments, describing experiments in English.
19th, 20th	Information Technology in Medical Engineering	Learning vocabulary related to digital technology, online research in English.
21st, 22nd	Reading Comprehension and Analysis	Reading specialized academic passages in biomedical engineering, analyzing academic texts.

23rd, 24th	Preparing for Academic Exams	Practice answering academic questions, review of grammar and vocabulary.
25th, 26th	Discussion and Interpretation in Engineering	Oral explanation and interpreting data and diagrams in English.
27th, 28th	Advanced Concepts in Medical Engineering	Learning advanced vocabulary, writing analytical passages and reports on recent advancements.
29th, 30th	Final Project and Presentation	Writing a final project report, preparing and presenting the project in English.

11. Assessment Method: Theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):

Textbooks 1-2:

- English for Academic Purposes – A book focusing on developing academic reading and writing skills.
- English for Engineering – A reference for vocabulary and structures used in engineering.

Textbooks 3-4:

- Fundamentals of English Grammar – Explains basic grammar rules in a simplified manner.
- Technical English for Engineers – A book specialized in enhancing linguistic skills for engineering students.

Main References (Sources):

Main Reference 1:

- Oxford English Dictionary – A reliable source for word definitions and expressions.
- Cambridge Academic English – An academic reference for developing reading and comprehension skills.

Main Reference 2:

- Essentials of Medical Terminology – A reference for medical terms used in English.
- Engineering English: A Guide for Engineers – A book showcasing specialized engineering terminology.

Recommended Additional References:

Journals and Reports:

- Journal of Engineering Education – A journal containing educational engineering articles and research.
- Biomedical Engineering Journal – Contains scientific research on medical devices and their applications.

Supplementary References:

- Technical Writing for Engineers – A guide for writing technical reports.
- Medical English for Health Professionals – A reference for medical terminology in healthcare.

Online References and Websites:

Online References:

- Coursera - Engineering Courses – Online courses on engineering and medical sciences.
- PubMed – An electronic medical library containing research articles related to medical devices.

Websites:

- Engineering.com – A website with articles and educational tools in the field of engineering.
- MedlinePlus – A medical reference site containing information on medical terminology in English.

10	
1. Course Name or Topic:	Arabic language
2. Course Code:	MIT110
3. Semester / Year:	Annual
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	30
7. Course Instructor(s):	

8. **Course Objectives**: Master grammatical rules and spelling principles. Analyze texts and extract main ideas. Develop expression skills and improve oral and written expression with clarity and precision

9. **Teaching and Learning Strategies**:
   - **Interactive Learning: Using activities and discussions to stimulate critical thinking.**
   - **Practical Application: Assigning students practical exercises to enhance understanding.**
   - **Self-Learning: Encouraging students to research and explore various sources.**
   - **Using Technology: Employing multimedia tools to improve comprehension and retention.**
   - **Continuous Assessment: Providing regular tests and exercises to measure student progress.**

10. Course Structure

Week	Topic
1	Concept of Linguistic Output
2	Rules for Writing Narratives and Open Texts
3-4	Long and Short Alif
5-6	Sun and Moon Letters
7-8	Pronouns and Phenomena
9-10	Writing Hamzah (Connecting and Isolated Hamzah, Middle and Final Hamzah)
11-12	Punctuation Marks
13-15	Nouns, Verbs, and Structures Between Them
16-17	Direct and Indirect Objects (Absolute, with, for, in, with)
18-19	Numbers
20	Applications of Linguistic Output
21-22	Meanings of Prepositions
23-24	The Rule of the Differentiating Alif
25-26	The Rule of Noon and Tanween
27-28	Formal Aspects of Administrative Writing
29-30	Language of Administrative Discourse

11. Assessment Method: Theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):
- Arabic Language: Its Grammar and Skills – Dr. Abdul Aziz Al-Douri.
- Clear Syntax – Dr. Hatem Saleh.

Main References (Sources):
- Clear Syntax by Ali Al-Jarim and Mustafa Amin.
- The Concise Grammar by Mohamed Khair Al-Halwani.
- Dictionaries and linguistic glossaries.

Supporting Books and References (Scientific Journals, Reports...):
- Articles from scientific journals specializing in the Arabic language.
- Academic reports on the development of the Arabic language and its rules.
- Comparative studies between Arabic grammar and other languages

Electronic References and Websites:
- Grammar learning websites such as Midan Al-Nahw Academy.
- Arabic grammar rules on the Rawaq educational platform.
- University websites offering digital educational content in language sciences

11	
1. Course Name or Topic:	Workshops
2. Course Code:	MIT111
3. Semester / Year:	Annual
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	120
7. Course Instructor(s):	

8. **Course Objectives**: Electronic Workshop: Learning about electronic components and their use in circuit construction and testing. Electrical Workshop: Gaining hands-on experience and scientific proficiency. Mechanical Workshop: Learning filing techniques, operating a lathe, and metal cutting.

9. **Teaching and Learning Strategies**:
   - **Hands-on Learning: Conducting practical experiments in workshops to enhance students' understanding of theoretical concepts.**
   - **Collaborative Learning: Encouraging teamwork through joint projects to solve applied problems.**
   - **Problem-Based Learning: Presenting real-world problems for students to solve, fostering critical and analytical thinking skills.**
   - **Blended Learning: Integrating traditional education with digital resources to enhance the learning experience.**
   - **Continuous Assessment: Using quizzes, lab reports, and projects to periodically evaluate students' progress.**

10. Course Structure

Electronic workshops	
Week	**topic**
1st	How to Use Different Measuring Instruments (Ohmmeter, Oscilloscope, Power Supply, Signal Generator)
2nd	How to Use Soldering Irons – Types of Soldering Irons Used in the Workshop – Soldering Training
3rd, 4th	Types of Auxiliary Soldering for Used Materials – Soldering Wires Together and Soldering Components
5th	How to Use a Desoldering Iron Such as (Solder Remover) (Solder Sucker) on Electronic Components and Remove Them from a Printed Circuit Board
6th, 7th	Printed Electronic Circuits on Different Boards – Understanding How to Prepare Them and Mount Various Electronic Components
8th, 9th	Required Tools – Resistors and How to Read Their Values in Different Ways – Variable and Special Resistors (VDR, PTC, NTC) and How to Test Them
10th	Various Tools Used Based on the Type of Insulator Between Capacitor Plates – Voltage Rating of Capacitors – Reading Capacitor Values in Different Ways – How to Test and Replace Capacitors
11th	Constructing a Circuit to Connect Capacitors in Series and Parallel, Testing the Circuit
12th	Types of Fuses Used in Electronic Circuits, Types of Wires Used in Fuses, Current Rating for Each Type, How to Repair Fuses
13th, 14th	Inductors, Their Types, Testing Methods, Electrical Transformers, Difference Between an Autotransformer and a Conventional Transformer
15th	Types of Semiconductors (Diodes, Transistors), Finding Equivalents, Testing Diodes, Testing Transistors, Testing Different Semiconductor Circuits

16th	Integrated Circuits – Understanding the Types of Integrated Circuits in Soldering, Desoldering Circuits for Removal and Replacement
17th	Scientific Video Presentation on the Manufacturing of Electronic Components (Resistors, Capacitors, Semiconductors, etc.)
18th	How to Read an Electronic Schematic, How to Trace Faults on an Electronic Schematic
19th	Introducing Students to Designing Electronic Circuits on a Printed Board
20th	How to Mount and Solder Electronic Components onto a Printed Circuit Board
21th	Implementing a Simple Electronic Circuit on a Printed Circuit Board
22th - 30th	Field Visit to an Electronic Manufacturing Facility
Electrical Workshops	
1st	Principles of Industrial Safety in the Electrical Workshop Protection from electric shocks. Identifying tools used in the workshop. Methods of using different types of soldering irons (including various types), and hot air soldering irons.
2nd	Electrical transformers – their types – magnetic circuits – electrical circuits – opening transformers – gathering information from the old transformer – plastic mold for the transformer – rewinding the primary and secondary windings.
3rd, 4th, 5th	Pronouns and phenomena – writing hamzah (connected and disconnected, middle and terminal hamzah) – punctuation marks – noun and verb distinctions and their focus – absolute object, direct object, object of purpose, object of place, and object of accompaniment – numerals – linguistic expression applications – meanings of prepositions – the rule of the separating alif – the rule of nun and tanween – formal writing aspects – administrative language.
6th, 7th	Induction motor (small water pump motor) – operating the motor, disassembling it, gathering information – operating the valve, winding coils, placing insulators, connecting leads, varnishing for insulation – testing and troubleshooting – possible faults in the motor (electrical and mechanical).
8th	Siemens foundation – drawing a lamp circuit with a control circuit – practical exercise on the circuit foundation.
9th	Drawing a parallel lamp circuit with a switch and socket – practical circuit application – drawing the internal connection of a fluorescent lamp circuit – replacing one lamp with a fluorescent lamp – LED lamps, their connections, and maintenance.
10th	Drawing a staircase lamp circuit using two-way switches – practical application of the circuit.
11th	Identifying electrical contacts – their types – usage – thermal relays – timing sequences.
12th	Operating a single-phase motor using an air contact with a push button.
13th	Operating a motor and changing the direction of rotation for a single-phase motor using contacts and timing sequence.
14th	Training on electrical installation (installation inside pipes).
15th	Pipe cutting process – creating threads – bending pipes – using spring pullers for pipes.
Mechanical workshops.	
1st	Lathe workshop: Various measuring devices and how to use them. How to operate the lathe and use various tools and cutting instruments.
2nd, 3rd	How to fix a workpiece on the lathe and perform different operations.
4th	Training on using the lathe to create different shapes.
5th, 6th	Shaping workshop: Different types of files, saws, and various measuring tools and their usage.

7th	Practice on filing and simple shaping operations.
8th	Exercise on cutting with a saw, training on drilling and tapping, and performing a simple exercise.
9th, 10th	Welding and gas welding: Familiarizing with the equipment and tools used, training on using gas welding in a simple exercise.
11th	Electric welding: Familiarizing with the equipment and tools used, training on using electric welding in a simple exercise.
12th	Spot welding: Familiarizing with the equipment and tools used, performing a simple exercise.

11. Assessment Method: Practical tests Theoretical exams, reports

12. Learning and Teaching Resources

Electronic Workshops:

Required textbooks:

- **"Fundamentals of Electronics" – Author: Dr. Mohamed Abdullah.**
- **"Electronic Workshop Guide" – Issued by the University of Technology.**

Main references:

- **"Principles of Electrical and Electronic Engineering" – Author: Dr. Ahmed Ali.**
- **"Practical Electronics" – Author: Jim Cox.**

Supporting books and references:

- **"Engineering and Technology Journal" – University of Technology.**
- **Reports from "The Iraqi Journal of Electrical and Electronic Engineering".**

Online references:

- **University of Technology website: https://www.uotechnology.edu.iq**
- **Department Library – Electrical Engineering: https://eee.uotechnology.edu.iq**

Electrical Workshops:

Required textbooks:

- "Electric Motors in the Home Workshop" – Author: Jim Cox.
- "Electrical Workshop Guide" – Issued by Al-Mustansiriya University.

Main references:

- "Electrical Power Engineering" – Author: Dr. Fahd Ali Hussein.
- "Basic Electrical Circuits" – Author: Dr. William Kemp.

Supporting books and references:

- "Engineering and Sustainable Development Journal" – Al-Mustansiriya University.
- Reports from "The Iraqi Journal of Electrical and Electronic Engineering".

Online references:

- Al-Mustansiriya University website: https://uomustansiriyah.edu.iq
- College of Engineering Lectures – Al-Mustansiriya University: https://uomustansiriyah.edu.iq/dept_lectures.php?id_dept=5

Mechanical Workshops:

Required textbooks:

- "Fundamentals of Mechanical Engineering" – Author: Dr. Mahmoud Shaker Said.
- "Mechanical Workshop Guide" – Issued by the Middle Technical University.

Main references:

- "Engineering Mechanics" – Author: Dr. Issam Jirjis Sloumi.
- "Welding and Cutting Technology" – Author: Dr. Anwar Mahmoud Abdel Wahid.

Supporting books and references:

- "Engineering Research Journal" – Middle Technical University.
- Reports from "Engineering and Technology Journal".

Online references:

- Middle Technical University website: https://mtu.edu.iq
- Institute Departments – Baghdad Institute of Technology: https://itb.mtu.edu.iq

These resources are approved by Iraqi universities and cover both theoretical and practical aspects of the mentioned workshops, helping students achieve a comprehensive and integrated understanding of the subjects.

12	
1. Course Name or Topic:	Mathematics 2
2. Course Code:	MIT201
3. Semester / Year:	Second year
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	90
7. Course Instructor(s):	

8. **Course Objectives**: Developing Mathematical Understanding: Providing students with a strong foundation in vector analysis, linear algebra, and vector calculus to understand engineering applications. Enhancing Analytical Skills: Enabling students to analyze and interpret mathematical concepts such as multiple integrals, infinite series, and complex variables. Applying Mathematics in Engineering: Using mathematical concepts to solve engineering problems, such as differential equations and vector theory. Learning Numerical Solutions: Training students to use tools and software such as MATLAB or Mathematica to solve complex mathematical problems. Preparing Students for Scientific Research and Practical Applications: Developing the ability to use mathematical knowledge in future studies and research projects.

9. **Teaching and Learning Strategies**:
   - **Using Interactive Lectures: Explaining fundamental mathematical concepts and engineering applications through interactive lectures.**
   - **Applying Problem-Based Learning: Using examples and practical exercises to encourage problem-solving.**
   - **Enhancing Understanding through Computational Programming: Utilizing engineering software like MATLAB or Mathematica to improve comprehension.**
   - **Assigning Research Tasks and Small Projects: Giving students research assignments and small projects to apply concepts to real-world problems.**
   - **Organizing Discussion Sessions: Promoting critical thinking and analyzing different solutions through group discussions.**

10. Course Structure

Week	Topic
1st, 2nd	Vector analysis and vector fields.
3rd, 4th	Linear algebra, vector calculus.
5th, 6th	Scalars and vectors-unit, orthogonal vectors.
7th, 8th	Dot product, cross product.
9th, 10th	Theory for vector fields, vector variable function.
11th, 12th	Polar and spherical coordinates – gradient in polar coordinates.
13th, 14th	Complex number, polar form of complex number, linear.
15th, 16th	Algebra for complex number in polar and spherical coordinates.
17th, 18th	Infinite series, power series.
19th	Convergence and divergence series.
20th	Number and complex series.
21st, 22nd	Complex variable, Cauchy – Riemann equations, complex series, Taylor series.
23rd	Differential equations.
24th, 25th	Differential equation of the first order and n order.
26th	Applications.
27th	Multiple integrations.
28th	Surface area.
29th	Green's theorem.
30th	Stokes theorem.

11. Assessment Method: Theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):

- "Advanced Engineering Mathematics" - Erwin Kreyszig
- "Vector Calculus" - Jerrold E. Marsden & Anthony J. Tromba
- "Complex Variables and Applications" - James Ward Brown & Ruel V. Churchill

Main References (Sources):

- "Linear Algebra and Its Applications" - Gilbert Strang
- "Mathematical Methods for Physicists" - George B. Arfken & Hans J. Weber
- "Differential Equations with Applications and Historical Notes" - George F. Simmons

Supporting Books and References (Scientific Journals, Reports...):

- Scientific Articles from journals like the Journal of Mathematical Analysis and Applications
- Research Reports from IEEE Transactions on Mathematics
- Booklets and Electronic References from global educational institutions

Electronic References and Websites:

- Khan Academy (www.khanacademy.org) for detailed mathematics lessons
- MIT OpenCourseWare (ocw.mit.edu) for lectures on engineering mathematics
- Wolfram Alpha (www.wolframalpha.com) for interactive mathematics solutions

13	
1. Course Name or Topic:	Anatomy and Physiology
2. Course Code:	MIT202
3. Semester / Year:	Second year
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	120
7. Course Instructor(s):	

8. **Course Objectives**: Understanding the physiological changes and studying the physiological, especially electrical, changes that occur when different organs perform their functions. Recognizing medical devices and understanding the relationship between physiological changes and medical devices.

9. **Teaching and Learning Strategies**:
   - **Interactive lectures to explain basic concepts and enhance discussion among students.**
   - **Use of multimedia such as anatomical models and 3D illustrations to understand the structure and functions of the body.**
   - **Hands-on and applied learning through studying clinical cases and linking them to theoretical concepts.**
   - **Small research projects to develop research and scientific exploration skills.**
   - **Continuous assessments and evaluations to reinforce understanding and encourage critical thinking.**

10. Course Structure

Week	Topic
1st, 2nd	Cells & Tissues.
3rd	The integumentary system.
4th	The skeletal system.
5th, 6th	Articulations.
7th	The muscular system.
8th	Nervous tissue.
9th	Central nervous system.
10th	Autonomic nervous system.
11th, 12th	Sensory, motor, and integrative functions.
13th	The endocrine system.
14th, 15th	The cardiovascular system: Blood.
16th, 17th	The cardiovascular system: The heart.
18th, 19th	The cardiovascular system: Blood vessels.
20th, 21st	The lymphatic system and immunity.
22nd, 23rd	The respiratory system.
24th, 25th	The digestive system.
26th	Metabolism.
27th	The urinary system.
28th, 29th	Fluid, electrolyte, and Acid–Base balance.
30th	The reproductive system.

11. Assessment Method: Practical tests, Theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):

- "Human Anatomy & Physiology" – Elaine N. Marieb & Katja Hoehn
- "Principles of Anatomy and Physiology" – Gerard J. Tortora & Bryan H. Derrickson
- "Medical Physiology" – Guyton and Hall

Main References (Sources):

- "Essentials of Human Anatomy & Physiology" – Elaine N. Marieb
- "Berne & Levy Physiology" – Bruce M. Koeppen & Bruce A. Stanton
- "Ross & Wilson Anatomy and Physiology in Health and Illness" – Anne Waugh & Allison Grant

Supporting Books and References (Scientific Journals, Reports...):

- Articles from the Journal of Physiology and the American Journal of Physiology.
- Research reports from the National Institutes of Health (NIH).
- Scientific reviews in the Annual Review of Physiology.

Electronic References and Websites:

- Khan Academy (www.khanacademy.org) for lessons in anatomy and physiology.
- OpenStax (openstax.org) for free textbooks in medical sciences.
- MedlinePlus (medlineplus.gov).

14	
1. Course Name or Topic:	Clinical Chemistry Devices
2. Course Code:	MIT203
3. Semester / Year:	Second year
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	120
7. Course Instructor(s):	

8. **Course Objectives**: Understanding Device Technologies: Studying and understanding the techniques used in devices employed in clinical chemistry. Practical Application of Knowledge: Using devices practically for diagnosing and analyzing clinical samples

9. **Teaching and Learning Strategies**:
   - **Learning based on practical experience through laboratory training on various devices.**
   - **Interactive lectures to explain the basics of chemical and laboratory analyses.**
   - **Analyzing clinical case studies to link laboratory applications with medical reality.**
   - **Self-learning and training on writing scientific reports about laboratory experiments.**
   - **Using technological programs to analyze laboratory data and interpret results.**

10. Course Structure

Week	Topic
1st	Work security in laboratories.
2nd	Quality control.
3rd	Best laboratory use.
4th, 5th	Spectrum instruments and uses.
6th, 7th	Ions measurement instrument.
8th, 9th	Salts measurements instrument and its uses.
10th, 11th	Auto-analysis instruments.
12th, 13th	Minerals measurement instrument.
14th, 15th	Elisa instrument and its uses.
16th, 17th	Electrical conduction.
18th, 19th	Osmetic conduction.
20th, 21st	Enzymes and their measurements.
22nd, 23rd	Proteins and importance.
24th, 25th	Fats and importance.
26th	Haemoglobin.
27th, 28th	Minerals and nutrition.
29th, 30th	Immunological chemistry.

11. Assessment Method: Practical exams, theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):

- "Clinical Chemistry: Principles, Techniques, and Correlations" – Michael Bishop
- "Tietz Textbook of Clinical Chemistry and Molecular Diagnostics" – Carl A. Burtis & David E. Bruns
- "Fundamentals of Analytical Chemistry" – Douglas A. Skoog

Main References (Sources):

- "Laboratory Instrumentation" – Mary C. Haven
- "Basic Clinical Laboratory Techniques" – Barbara H. Estridge
- "Principles of Biochemistry" – Lehninger

Supporting Books and References (Scientific Journals, Reports...):

- Articles from the Clinical Biochemistry Journal
- Research reports from the American Association for Clinical Chemistry (AACC)
- Studies published in the Journal of Analytical Chemistry

Electronic References and Websites:

- LabTestsOnline (www.labtestsonline.org) for interpreting lab tests
- National Center for Biotechnology Information (NCBI) (www.ncbi.nlm.nih.gov) for the latest research
- Clinical Chemistry Online (www.clinchem.org) for articles and research in clinical chemistry

15	
1. Course Name or Topic:	Electronic Components and Circuits
2. Course Code:	MIT204
3. Semester / Year:	Second year
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	150
7. Course Instructor(s):	

8. **Course Objectives:** Introduction to Electronic Circuits: Understanding the components of electronic circuits and how to design them. Practical Applications: Using electronic circuits in multiple practical applications.

9. **Teaching and Learning Strategies**:
   - **Interactive Lectures to explain the basic concepts and encourage discussion among students.**
   - **Practical Training in Laboratories to understand the performance of electronic devices and analyze their operation.**
   - **Projects and Practical Applications to design and test electronic circuits.**
   - **Use of Simulation Software like Multisim and Proteus to study electronic circuits.**
   - **Analysis of Electronic Circuits through case studies of real engineering projects.**

10. Course Structure

Week	Topic
1st	Electronic values (review), Symbols and Units.
2nd, 3rd	Semiconductor materials and PN junctions.
4th, 5th	Diode applications.
6th, 7th	Special diodes.
8th, 9th	Bipolar junction transistor (characteristics and biasing).
10th, 11th	Field effect transistor (characteristics and biasing).
12th	Small signal amplifier.
13th, 14th	Other semiconductor devices (UJT, SCR, Diac, Triac, ..).
15th, 16th	Optoelectronic devices.
17th, 18th	Frequency response.
19th, 20th	Negative feedback.
21st	Differential amplifier.
22nd	Operational amplifier.
23rd, 24th	Basic OP-Amp application.
25th, 26th	Sinusoidal oscillator.
27th, 28th	Non-sinusoidal oscillator.
29th	Power amplifier.

11. Assessment Method: Practical Tests, Theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):

- "Electronic Devices and Circuit Theory" – Robert L. Boylestad & Louis Nashelsky
- "Microelectronic Circuits" – Adel S. Sedra & Kenneth C. Smith
- "Principles of Electronics" – V.K. Mehta & Rohit Mehta

Main References (Sources):

- "Fundamentals of Microelectronics" – Behzad Razavi
- "Power Electronics: Converters, Applications, and Design" – Ned Mohan
- "The Art of Electronics" – Paul Horowitz & Winfield Hill

Supporting Books and References (Scientific Journals, Reports...):

- Articles from IEEE Transactions on Circuits and Systems
- Studies from Journal of Electronic Materials
- Technical reports from Electronics World

Electronic References and Websites:

- All About Circuits (www.allaboutcircuits.com) for lessons and practical applications
- MIT OpenCourseWare (ocw.mit.edu) for lectures on electronic circuits
- Texas Instruments Learning Center (www.ti.com) for courses on circuit design

16	
1. Course Name or Topic:	Digital Techniques
2. Course Code:	MIT205
3. Semester / Year:	Second Year
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	120
7. Course Instructor(s):	

8. **Course Objectives**: Understanding Logic Circuits: Learning the fundamentals of logic circuits used in computers and electronic medical devices. Building Digital Circuits: How to build simple digital circuits using truth tables.

9. **Teaching and Learning Strategies**:
   - **Theoretical Lectures to explain the basic principles of digital and logic circuits.**
   - **Practical Training in laboratories to design and simulate circuits using software such as Logisim and Proteus.**
   - **Projects and Practical Applications to design and build digital electronic systems.**
   - **Case Studies of real projects to gain a deeper understanding of the applications of digital circuits.**
   - **Use of Tests and Quizzes to reinforce both the practical and theoretical understanding of the students.**

10. Course Structure

Week	Topic
1st, 2nd	Number system: Binary numbers, Octal numbers, Hexadecimal numbers.
3rd, 4th	Binary codes.
5th, 6th	Logic gates.
7th, 8th	De Morgan's theorems.
9th, 10th	Laws and theorems of Boolean algebra.
11th, 12th	Arithmetic circuit.
13th, 14th, 15th	Simplifying logic circuits: fundamental products, sum of products, algebraic simplification.
16th, 17th, 18th	Truth table to Karnaugh map.
19th, 20th, 21st	Flip-Flop: RS, RST, JK, D, FF.
22nd, 23rd, 24th	Counters.
25th, 26th	Special counters and shift registers.
27th, 28th	Digital to analog conversion.
29th, 30th	Analog to digital conversion.

11. Assessment Method: Practical Exams , Theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):

- "Digital Design" – M. Morris Mano & Michael D. Ciletti
- "Fundamentals of Digital Logic with Verilog Design" – Stephen Brown & Zvonko Vranesic
- "Digital Fundamentals" – Thomas L. Floyd

Main References (Sources):

- "Digital Electronics: Principles and Applications" – Roger L. Tokheim
- "Introduction to Digital Logic Design" – John P. Hayes
- "Digital Systems: Principles and Applications" – Ronald J. Tocci

Supporting Books and References (Scientific Journals, Reports...):

- Articles from IEEE Transactions on Digital Systems
- Research and reports from Journal of Circuits, Systems, and Computers
- Studies published in Digital Signal Processing Journal

Electronic References and Websites:

- All About Circuits (www.allaboutcircuits.com) for advanced lessons on digital circuits
- MIT OpenCourseWare (ocw.mit.edu) for lectures on digital electronics
- Texas Instruments Learning Center (www.ti.com) for courses on digital circuit design

17	
1. Course Name or Topic:	Mechanics
2. Course Code:	MIT107
3. Semester / Year:	Annual
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	60
7. Course Instructor(s):	

8. **Course Objectives**: Understanding Basic Components: Learning the fundamental components of measuring devices. Using Devices: Acquiring skills in operating measuring instruments.

9. **Teaching and Learning Strategies**:
   - **Problem-Based Learning: Study real-world mechanical problems such as structure design and force calculations.**
   - **Practical Experiments in Labs: Conduct experiments on various components and test how forces affect them.**
   - **Project-Based Learning: Apply mechanical concepts in the design and analysis of structures and components.**
   - **Group Discussions: Exchange views on engineering problems and various solution methods.**
   - **Use of Engineering Software: Training on software such as AutoCAD and ANSYS for force and stress analysis in materials..**

10. Course Structure

Week	Topic
1st	Introduction, resultant of force system.
2nd	Component of force.
3rd	Moment of force.
4th , 5th	Couples, resultant of coplanar force systems.
6th , 7th	Equilibrium of force system.
8th , 9th	Non-coplanar force systems, equilibrium of non-coplanar concurrent force.
10th , 11th	Analysis of structures.
12th , 13th	Methods of joint problems.
14th , 15th	Friction.
16th , 17th	Centroid.
18th , 19th	Second moment of area.
20th	Material properties.
21st , 22nd	Stresses.
23rd	Simple strain.
24th	Variable stresses.
25th , 26th	Bending & beams.
27th , 28th	Riveted and welded connections.
29th , 30th	Special topics.

11. Assessment Method: Theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):

- Engineering Mechanics: Dynamics and Statics by J.L. Meriam & L.G. Kraige
- Mechanics of Materials by R.C. Hibbeler
- Strength of Materials by Ferdinand P. Beer

Main References (Sources):

- Advanced Mechanics of Materials by Arthur P. Boresi
- Introduction to Solid Mechanics by Irving H. Shames
- Statics and Mechanics of Materials by R.C. Hibbeler

Supporting Books and References (Scientific Journals, Reports...):

- Journal of Applied Mechanics
- International Journal of Solids and Structures
- Technical reports on materials testing and structural mechanics

Electronic References and Websites:

- MIT OpenCourseWare - Solid Mechanics (ocw.mit.edu)
- Engineering Toolbox - Material Properties (www.engineeringtoolbox.com)
- Coursera - Mechanics of Materials (www.coursera.org)

18	
1. Course Name or Topic:	Medical Devices/1
2. Course Code:	MIT207
3. Semester / Year:	Annual
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	150
7. Course Instructor(s):	

8. **Course Objectives**: Understanding Medical Devices: Studying the medical device as a purely electronic device and understanding how it differs from other electronic devices. Practical Training: Training on the internal electronic circuits of medical devices, their operation, and maintenance methods.

9. **Teaching and Learning Strategies**:
   - **Theoretical lectures on the operating principles of various medical devices.**
   - **Practical training in laboratories to understand how to use and maintain medical devices.**
   - **Applied projects to design and analyze the performance of common medical devices.**
   - **Using simulation programs like Multisim and LabVIEW to study the operation of medical devices.**
   - **Demonstrations and case studies on the clinical applications of medical devices.**

10. Course Structure

Week	Topic
1st	Introduction to medical instruments.
2nd, 3rd	Electronic balance.
4th, 5th	Thermal instruments.
6th	Water baths.
7th, 8th	Ovens.
9th, 10th	Autoclave.
11th, 12th	Incubators (Lab.).
13th, 14th	Water distiller.
15th, 16th	Cautery.
17th, 18th	Other thermal instruments.
19th, 20th	Centrifuge.
21st, 22nd, 23rd	Microscopes (light, dark field, fluorescent, polarized, electron).
24th, 25th	X-ray equipment.
26th, 27th	Rehabilitation equipment.
28th, 29th	Medical gases system.
30th	Infant incubators.

11. Assessment Method: Practical exams, Theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):

- Introduction to Biomedical Engineering Technology" – Laurence J. Street
- Medical Instrumentation: Application and Design" – John G. Webster
- Handbook of Biomedical Instrumentation" – R. S. Khandpur

Main References (Sources):

- Biomedical Device Technology: Principles and Design" – Anthony Y. K. Chan
- Clinical Engineering Handbook" – Ernesto Iadanza
- The Biomedical Engineering Handbook" – Joseph D. Bronzino

Supporting Books and References (Scientific Journals, Reports...):

- Articles from IEEE Transactions on Biomedical Engineering
- Research from the Journal of Medical Devices
- Studies from the Medical Physics Journal

Electronic References and Websites:

- NIH (National Institutes of Health) (www.nih.gov) for information on medical devices
- Medical Device & Diagnostic Industry (www.mddionline.com) for articles on modern medical devices
- MIT OpenCourseWare (ocw.mit.edu) for courses on biomedical engineering

19	
1. Course Name or Topic:	Computer Applications/2
2. Course Code:	MIT208
3. Semester / Year:	Second year
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	90
7. Course Instructor(s):	

8. **Course Objectives**: Understanding Networks and the Internet: Learning about the concept of networks, their types, how to connect to the global network, and using search engines. Programming with Visual Basic: Learning the basics of programming in Visual Basic.

9. **Teaching and Learning Strategies**:
   - **Interactive lectures to explain the fundamental concepts in Visual Basic.**
   - **Practical training through implementing software applications during lectures and labs.**
   - **Individual and group projects to develop programming skills and build real-world applications.**
   - **Quizzes and practical applications to assess students' understanding.**
   - **Analyzing and studying open-source code to gain more practical experience.**

10. Course Structure

Week	Topic
1 – 3	Internet Networks - The concept of networks and the internet, their operation, components, connecting to the global network, using search engines like Yahoo, Google, and methods for searching information.
4 – 6	Flowcharts in Programming.
7	Introduction to Visual Basic, familiarizing with the program screen, applying control key properties, and adding source code.
8	Mathematical expressions in VB such as: * + , = , > , <, and others.
9	VB functions like: ABS, ASC, Chr, Cos, Date, Rnd, Sin, and others.
10	Using the IF statement in its various types: if/then, if then/end if, if/then/else/end if, Select case, Go to.
11	Loops such as: Do while, Do until, Do/loop while, Do/loop until, for/next.
12 – 15	Familiarizing with various tools in the Tool Box such as: Message Box, Command Buttons, Label Bones, Text Boxes, Check Boxes, Option Buttons, Frames, List Boxes, Combo Boxes, Scroll Bars, Shape, Picture, Image, Drive List Box, Directory/File List Box, Common Dialog Box.
16	Creating a stand-alone VB application.
17	Adding command menus to a VB application using the Menu Editor.
18	Creating operational VB applications, designing icons, using VB Package & Deployment Wizard.
19	Error handling in the program (Error Handling, Debugging).
20	Working with text files (Open/close file, Read from file, Write to file, Print).
21	Drawing techniques in VB (Paste, Current X, Current Y, Line, Circle, CLS).
22	Working with colors and printing in VB (Colors, Mouse Events, Drag & Drop).

23	Using the Timer control, time properties, movement techniques, random numbers, and an introduction to game design.
24	Working with multimedia (Sounds & Multimedia), and using advanced keys such as: Mashed Edit Control, Chart Controls, Rich Text Box, Slider, Tabbed Dialog, Multiple Forms.
25	Various examples and applications.
26	Familiarizing with the use of some advanced keys (Advanced Keys).
27 – 30	Various examples and applications.

11. Assessment Method: Practical exams, theoretical exams, reports.

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):

- "Programming in Visual Basic 2010" – Julia Case Bradley & Anita Millspaugh
- "Microsoft Visual Basic Step by Step" – Michael Halvorson

Main References (Sources):

- "Mastering Visual Basic" – Evangelos Petroutsos
- "Visual Basic for Applications (VBA) for Dummies" – Richard Mansfield

Supporting Books and References (Scientific Journals, Reports...):

- Articles from Microsoft Developer Network (MSDN) on VB
- Studies and reports from the Journal of Software Engineering

Electronic References and Websites:

- Microsoft Docs - Visual Basic (https://learn.microsoft.com/en-us/dotnet/visual-basic/)
- W3Schools - Visual Basic (https://www.w3schools.com/asp/asp_vb.asp)
- Stack Overflow (https://stackoverflow.com/)

20	
1. Course Name or Topic:	English /2
2. Course Code:	MIT209
3. Semester / Year:	Second year
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	30
7. Course Instructor(s):	

8. **Course Objectives**: Learning and using new vocabulary related to different topics. Understanding and using different tenses such as the simple present, present continuous, simple past, and past continuous.

9. **Teaching and Learning Strategies**:
   - **Problem-Based Learning: Assigning students to solve real engineering and medical problems using the English language.**
   - **Interactive Learning: Using discussions, group activities, and presentations to enhance understanding.**
   - **Research-Based Learning: Encouraging students to read and analyze scientific articles.**
   - **Experiential Learning: Applying the English language in writing technical reports and presentations.**
   - **E-Learning: Using digital resources and websites to support learning.**

10. Course Structure

Week	Topic	Details
1st, 2nd	Review	Revisiting grammar, vocabulary, and academic writing basics.
3rd, 4th	Advanced Grammar for Engineers	Complex sentence structures, passive voice, and conditionals.
5th, 6th	Scientific and Technical Writing	Writing lab reports, technical descriptions, and scientific summaries.
7th, 8th	Biomedical Terminology	Understanding key medical and engineering terminology.
9th, 10th	Reading Scientific Papers	Strategies for reading and analyzing biomedical engineering research articles.
11th, 12th	Writing Research Abstracts and Summaries	Summarizing scientific content concisely and effectively.
13th, 14th	Professional Communication	Writing formal emails, letters, and reports in an academic and professional context.
15th, 16th	Listening and Note-Taking Skills	Strategies for understanding academic lectures and technical discussions.
17th, 18th	Engineering Case Studies	Reading and discussing real-world biomedical engineering case studies.
19th, 20th	Presentation Skills	Creating and delivering technical presentations.
21st, 22nd	Technical Report Writing	Structuring and writing detailed engineering reports.
23rd, 24th	Biomedical Ethics and Regulations	Reading and discussing ethical and regulatory aspects of biomedical technology.
25th, 26th	Data Interpretation and Analysis	Understanding and describing charts, graphs, and technical data.
27th, 28th	Review and Exam Preparation	Revisiting key concepts, practicing test-taking strategies.
29th, 30th	Final Project and Presentation	Preparing a project report and delivering a final presentation.

11. Assessment Method:, theoretical exams, reports.

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):

- English for Science and Technology" – A book focusing on technical terminology and scientific communication.
- "Technical English for Engineers" – A reference for teaching English in the engineering field.

Main References (Sources):

- "Academic Writing for Graduate Students" – A reference for developing academic writing skills.
- "Oxford Handbook of Medical Engineering" – A book covering essential engineering and medical

Supporting Books and References (Scientific Journals, Reports...):

- Journal of Biomedical Engineering" – A journal containing recent research and reports.
- "Engineering Ethics and Professionalism" – A reference discussing ethical issues in medical

Electronic References and Websites:

- "PubMed" – A database for medical research.
- "IEEE Xplore" – A digital library containing articles related to medical engineering.
- "Coursera - English for Science and Technology" – A specialized course in scientific English.

21	
1. Course Name or Topic:	Systematic Training
2. Course Code:	MIT210
3. Semester / Year:	Second year
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	-
7. Course Instructor(s):	

8. **Course Objectives**: Achieving the Goal: Ensuring that students are able to meet the set objectives of the course. Developing Motor Skills: Improving students' motor skills through systematic training.

9. **Teaching and Learning Strategies**:
   - **Theoretical lectures on medical devices and occupational safety systems.**
   - **• Practical training in laboratories and hospitals to understand the operation of different devices.**
   - **• Analyzing case studies on occupational safety issues in the medical environment.**
   - **• Demonstrations and educational videos on the mechanisms of modern medical devices.**
   - **• Research projects and reports on recent innovations in medical devices and their importance in healthcare.**

10. Course Structure

Week	Topic
1	Occupational Safety includes: Safety of the worker from electric shock, radiation, and any occupational hazards. Patient safety during diagnosis and treatment from exposure to electrical current or excessive radiation doses.
2	Laboratory Devices.
3	Kidney Unit Devices.
4	Neonatal Unit Devices.
5	Radiology Unit Devices.
6	CT Scanner.
7	Anesthesia Devices.
8 – 9	Medical Equipment Unit.
10	Endoscopy Devices.

11. Assessment Method:, practical exams, theoretical exams, reports.

12. Learning and Teaching Resources

22	
1. Course Name or Topic:	Medical Electronic Systems
2. Course Code:	MIT301
3. Semester / Year:	Third year
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	120
7. Course Instructor(s):	

8. **Course Objectives**: Understanding Electronic Circuits: Introducing students to some electronic circuits, how they work, and their applications in the medical field. Practical Applications: Using electronic circuits in medical applications and building different systems.

9. **Teaching and Learning Strategies**:
   - **Interactive Learning: Using brainstorming and discussions in lectures to deepen understanding.**
   - **• Learning through Practical Application: Conducting practical experiments and models to ensure the application of theoretical concepts.**
   - **• Project-Based Learning: Assigning students practical projects that integrate electrical and medical systems to encourage innovation.**

10. Course Structure

Week	Topic
1st	Regulated Power Supplies
2nd	Monolithic Regulators
3rd	Switching Regulators
4th-5th	Additional Switching Regulator Topologies
6th	Active Filters
7th-8th	Butterworth Filter, Practical Realization
9th-10th	Band-Pass Filter, Band-Reject Filter
11th-12th	Active Resonant and Band-Pass Filter
13th	Active RC Band-Pass Filter
14th	Digital to Analogue Converters (DAC)
15th	A Ladder-Type DAC, Multiplying DAC
16th	Analogue to Digital Converters (ADC)
17th-18th	The Counting ADC, Successive Approximation ADC
19th-20th	The Parallel-Comparator ADC, Dual-Slope or Radiometric ADC
21st-23rd	Medical Data Acquisition System
24th	Microcomputer-Based System
25th	Monitoring
26th-27th	Control
28th-29th-30th	Other Medical Electronic Systems

11. Assessment Method: practical exams, Theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):

- "Power Supply Design Handbook"
- "Medical Instrumentation: Application and Design"

Main References (Sources):

- "Electronic Devices and Circuit Theory" (Robert Boylestad)
- "Analog Electronics" (J. Millman & C. Halkias)

Supporting Books and References (Scientific Journals, Reports...):

- Scientific articles and journals such as IEEE Transactions on Medical Electronics.
- Research reports related to power systems in medical devices.

Electronic References and Websites:

- Websites such as IEEE Xplore and ScienceDirect.
- Educational videos on YouTube explaining the designs of power regulators and DAC/ADC arrays.

23	
1. Course Name or Topic:	Digital Signal Processing (DSP)
2. Course Code:	MIT302
3. Semester / Year:	Third year
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	120
7. Course Instructor(s):	

8. Course Objectives: Understanding Basic Topics: Teaching students the fundamental topics in signal processing.Practical Applications: Using signal processing techniques in audio and image signal processing..

9. Teaching and Learning Strategies:

- **Hands-on Learning: Conducting practical exercises to apply techniques such as Fourier Transform and Z-transform in signal processing.**
- **• Project-Based Learning: Encouraging students to work on projects related to audio and image processing using IIR and FIR filter techniques.**
- **• Interactive Learning: Combining theoretical lectures with group discussions and knowledge sharing on modern signal processing techniques.**

10. Course Structure

1st-3rd	**Introduction to signal processing**
4th-6th	**Convolution and sampled data system**
7th-9th	**Fourier series and Fourier transform**
10th-12th	**Z – Transform**
13th-14th	**Discrete Fourier transform (DFT)**
15th-16th	**Fast Fourier transform (FFT)**
17th-19th	**Digital filtering**
20th-22nd	**IIR digital filters**
23rd-24th	**FIR digital filters**
25th-27th	**Speech processing**
28th	**Image processing**

11. Assessment Method: Practical exams, theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):

- "Discrete-Time Signal Processing" (Alan V. Oppenheim)
- "Digital Signal Processing: Principles, Algorithms, and Applications" (John G. Proakis)

Main References (Sources)

- "Signals and Systems" (Alan V. Oppenheim, Alan S. Willsky)
- "Introduction to Digital Signal Processing" (John H. Jensen)

Supporting Books and References (Scientific Journals, Reports...):

- Scientific articles from journals such as IEEE Transactions on Signal Processing.
- • Recent research reports on the applications of FFT in signal processing.

Electronic References and Websites:

- MATLAB Central website for obtaining application programs.
- Lessons and articles on websites like Coursera and edX.

24	
1. Course Name or Topic:	Medical Communication Systems
2. Course Code:	MIT303
3. Semester / Year:	Third year
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	120
7. Course Instructor(s):	

8. **Course Objectives**Understanding Communication Systems: Knowledge of the systems and structures of radio, television, and telephone systems.Information Transfer: Understanding methods of information transfer in communication systems in medical devices..

9. **Teaching and Learning Strategies**:
   - **Project-Based Learning: Assigning practical projects that help students apply concepts related to various fields like electromagnetism and signal processing.**
   - **• Interactive Learning: Using discussion and debate techniques to stimulate critical thinking on topics like Gauss's laws, magnetic fields, and time-varying variables.**
   - **• Learning through Practical Applications: Conducting laboratory experiments or digital simulations to test concepts such as plane waves, Fourier transform, or AM/FM systems.**

10. Course Structure

1st General review in electrostatics

2nd Gauss's law

3rd Steady magnetic field

4th-5th Time – varying magnetic field

6th Uniform plane waves

7th-8th Fourier transform

9th-19th Signals & system

11th-12th Periodic, non-periodic signals

13th-14th AM & FM systems

15th-17th Sampling, PAM, PWM, PPM, PCM

19th-20th Digital modulation (ASK, FSK, PSK)

21st-22nd Noise in analogue & digital systems

23rd-24th Rectangular wave-guides

25th-26th Microwave passive devices

27th-28th Microwave generators

11. Assessment Method: Practical exams, theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any)

- "Electromagnetic Waves and Radiating Systems" (Edward C. Jordan, Keith G. Balmain)
- "Principles of Communication Systems" (Herbert Taub, Donald Schilling)

Main References (Sources):

- "Introduction to Electrodynamics" (David J. Griffiths)
- "Signals and Systems" (Alan V. Oppenheim)

Supporting Books and References (Scientific Journals, Reports...):

- Scientific articles from journals such as IEEE Transactions on Communications.
- Research reports on the latest technologies in the fields of communications and electromagnetic waves.

Electronic References and Websites:

- Websites such as IEEE Xplore and ScienceDirect.
- Educational courses on websites like Coursera and edX related to electromagnetism and communications

25	
1. Course Name or Topic:	Medical Devices/2
2. Course Code:	MIT304
3. Semester / Year:	Third year
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	150
7. Course Instructor(s):	

8. **Course Objectives**: Understanding Medical Devices: Studying medical devices as purely electronic devices and understanding how they differ from other electronic devices. Practical Training: Training on the internal electronic circuits of medical devices, how they operate, and their maintenance methods.

9. **Teaching and Learning Strategies**:
   - **Problem-Based Learning: Studying clinical cases to apply medical devices.**
   - **• Simulation Learning: Using simulation programs to study medical imaging systems.**
   - **• Practical Training: Laboratory experiments on devices for monitoring cardiac and respiratory functions.**
   - **• Project-Based Learning: Designing prototypes for diagnostic and therapeutic devices.**
   - **• Interactive Learning: Discussing the latest developments in healthcare technologies..**

10. Course Structure

Week	topic
1st-3rd	Cardiac function recorders and monitors
4th-6th	Surgical scopes
7th-9th	Audiological system
10th-12th	Ophthalmic system
13th-18th	Imaging technologies: Ultrasound, Radiation, Thermal, NMR, etc.
19th-21st	Pulmonary function system
22nd-24th	Pathological units
25th-27th	Therapeutic diathermy
28th-30th	Coronary care units

11. Assessment Method: Practical exams, theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):
- "Medical Instrumentation: Application and Design" – John G. Webster
- "Biomedical Signal Processing and Signal Modeling" – Eugene N. Bruce

Main References (Sources):
- "Introduction to Biomedical Engineering" – John Enderle
- "Handbook of Biomedical Instrumentation" – R. S. Khandpur

Supporting Books and References (Scientific Journals, Reports...):
- Articles from IEEE Transactions on Biomedical Engineering.
- Reports on the latest technologies in therapeutic and diagnostic medical devices.

Electronic References and Websites:
- IEEE Xplore

- ScienceDirect
- Courses on Coursera and edX

26	
1. Course Name or Topic:	Microprocessor and Microcontroller
2. Course Code:	MIT305
3. Semester / Year:	Annual
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	120
7. Course Instructor(s):	

8. **Course Objectives**: Understanding Logic Circuits: Training students on the fundamentals of logic circuits used in electronic computers and how they operate. Building Logic Circuits: Learning how to construct logic circuits and use them in various applications.

9. **Teaching and Learning Strategies**:
   - **Interactive Learning: Discussing the architecture of microprocessors and how they work.**
   - **Hands-on Learning: Implementing practical projects on real microprocessors.**
   - **Practical Training: Programming microprocessors using assembly languages.**
   - **Problem-Based Learning: Solving challenges related to memory systems and storage.**
   - **Simulation Learning: Using programs like Proteus and Keil to simulate microprocessor systems..**

10. Course Structure

Week	topic
1st-3rd	Introduction to microprocessor and microcomputer
4th-6th	Semiconductor memories (ROMs & RAMs)
7th-9th	Auxiliary (backing) memories (magnetic tape, disk, etc.)
10th-12th	Microprocessor architecture
13th-15th	Bus signal timing & I/O timing
16th-18th	Microprocessor interfacing
19th-21st	Instruction sets & addressing modes
22nd-23rd	Digital I/O (parallel I/O & serial I/O)
24th-26th	Analogue I/O (interfacing ADC & DAC to microprocessor)
27th-28th	Standard buses (serial & parallel buses)
29th-30th	Some practical microprocessor applications

11. Assessment Method: Practical exams, theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):
- "Microprocessor Architecture, Programming, and Applications with the 8085" – Ramesh S. Gaonkar
- "The Intel Microprocessors: Architecture, Programming, and Interfacing" – Barry B. Brey

Main References (Sources):
- "Computer Organization and Design" – David A. Patterson & John L. Hennessy
- "Embedded Systems: Real-Time Interfacing" – Jonathan W. Valvano

Supporting Books and References (Scientific Journals, Reports...):
- Articles from IEEE Transactions on Embedded Systems
- Reports on the latest developments in microprocessors and embedded systems

Electronic References and Websites:
- IEEE Xplore
- ScienceDirect
- Courses on: Coursera, edX

27	
1. Course Name or Topic:	Power Electronics
2. Course Code:	MIT306
3. Semester / Year:	Third year
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	120
7. Course Instructor(s):	

8. **Course Objectives**: Understanding Electronic Components: Using various electronic components and analyzing related power electronics circuits.Circuit Analysis: Analyzing power electronics-related circuits.

9. **Teaching and Learning Strategies**:
   - **Interactive Learning: Discussing the principles of power electronics and its key applications.**
   - **• Hands-on Learning: Conducting practical experiments on power control circuits.**
   - **• Project-Based Learning: Designing UPS and SMPS systems as practical models.**
   - **• Simulation and Computational Experiments: Using programs like MATLAB and PSPICE to simulate circuits.**
   - **• Practical Training: Working with power electronics components like transformers, inverters, and rectifiers.**

10. Course Structure

week	Topic
1st	Introduction to power electronics
2nd-3rd	Switching devices, power & control device
4th-5th	Types and characteristics, rating (diode, transistor, etc.)
6th-8th	Methods of turning-on & turning-off
9th-10th	Protection of power devices
11th-12th	Triggering & base drive circuits
13th-15th	Controlled rectifiers, 1-phase & 3-phase circuits
16th-18th	Half-wave & full-wave circuits
19th-21st	D.C choppers; step-up & step-down choppers
22nd-23rd	A.C phase controllers
24th-26th	Inverters, 1-phase & 3-phase bridges
27th-28th	Some applications: uninterruptible power supply (UPS)
29th-30th	Switching mode power supply (SMP)

11. Assessment Method: Practical exams, theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):
- "Power Electronics: Converters, Applications, and Design" – Ned Mohan
- "Fundamentals of Power Electronics" – Robert W. Erickson

Main References (Sources):
- "Power Electronics: Devices, Circuits, and Applications" – Muhammad H. Rashid
- "Modern Power Electronics and AC Drives" – Bimal K. Bose

Supporting Books and References (Scientific Journals, Reports...):
- Articles from IEEE Transactions on Power Electronics
- Reports on power electronics applications in modern systems

Electronic References and Websites:
- IEEE Xplore
- ScienceDirect
- Courses on:• Coursera• edX

28	
1. Course Name or Topic:	Electrical Technology
2. Course Code:	MIT307
3. Semester / Year:	Third year
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	120
7. Course Instructor(s):	

8. **Course Objectives**: Understanding Electrical Technology: Studying the fundamentals of electrical technology, electric motors, and various electrical transformers Operating and Maintaining Devices: Learning the theory behind electrical devices and how to operate them..

9. **Teaching and Learning Strategies**:
   - **Problem-Based Learning: Analyzing and diagnosing faults in motors and generators.**
   - **Hands-on Experiments: Conducting tests on transformers and electrical machines.**
   - **Interactive Learning: Discussing practical circuits and modern methods for motor control.**
   - **Using Computational Simulations: Utilizing programs like MATLAB to simulate electrical systems.**
   - **Practical Training: Hands-on application in laboratories for wiring and testing electric motors and generators.**

10. Course Structure

week	topic
1st-2nd	Transformers: Single-phase transformer and construction
3rd	Theory of operation, no-load and short-circuit test
4th-5th	Equivalent circuit, autotransformers, instrument transformers
6th-7th	Three-phase transformers, construction methods of connection
8th-9th	Electromechanical energy conversion principles, relay operation
10th-12th	DC Machines: EMF and torque equation, equivalent circuit, methods of excitation, generator characteristics
13th-15th	Motor characteristics, testing, calculation of losses and efficiency
16th-18th	Induction machines: Equivalent circuit, basic equation, simple analysis, testing
19th-21st	Single-phase induction motor, methods of starting, split-phase, capacitor short, capacitor run, shaded pole motors
22nd-23rd	Synchronous machines: Generators and motors, equivalent circuit, basic equation
24th-25th	Special machines: Reluctance motor, hysteresis motor, linear motor, stepper motor, dry cup type motor, servo motor, etc.
26th-27th	Control switches: Pilot switches, push buttons, limits
28th	Switches: Float switches, contactors, pressure switches
29th-30th	High voltage circuits

11. Assessment Method: Practical exams, theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):
- "Electric Machinery Fundamentals" – Stephen J. Chapman
- "Electrical Machines, Drives, and Power Systems" – Theodore Wildi

Main References (Sources):
- "Principles of Electric Machines and Power Electronics" – P.C. Sen
- "Transformer and Induction Machines" – K. Murugesh Kumar

Supporting Books and References (Scientific Journals, Reports...):
- Articles from IEEE Transactions on Energy Conversion

- Reports on modern transformer and electric motor technologies

Electronic References and Websites:

- IEEE Xplore
- ScienceDirect
- Courses on Coursera and edX

29	
1. Course Name or Topic:	Computer Applications
2. Course Code:	MIT308
3. Semester / Year:	Annual
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	90
7. Course Instructor(s):	

8. **Course Objectives**: Understanding the MATLAB Environment: Understanding how to use different MATLAB windows such as the command window and workspace.Programming with MATLAB: Learning how to use programming structures like arrays, built-in functions, and control data.

9. **Teaching and Learning Strategies**:
   - **Project-Based Learning: Implementing practical projects using MATLAB and LabVIEW.**
   - **Hands-on Experiments: Practical application on the MATLAB and LabVIEW environment with real-world exercises.**
   - **Interactive Learning: Engaging students in solving programming problems during lectures.**
   - **Simulation-Based Learning: Using computational simulations to understand graphical programming.**
   - **Progressive Assessment: Discussions and short tests to ensure understanding of fundamental.**

10. Course Structure

week	topic
1st week	Introduction, MATLAB Environment, MATLAB Windows (Command Window, Workspace Window, Command History Window, Help Window, Editor Window).
2nd, 3rd week	A First Program, Expressions, Constants, Entering Matrices, Useful Matrix Generators, Subscripting, End as a subscript, Colon Operator, Transpose, Deleting Rows or Columns.
4th week	Variables and assignment statement, logical operator.
5th week	Arrays, Built-in functions, Basic Matrix Functions (sum, max, min, mean, magic, diag, length, size, median, prod, sort).
6th, 7th week	Basic Plotting (Multiple Data Sets in One Graph, Specifying Line Styles and Colors, Multiple Plots in One Figure, Setting Axis Limits). Arguments and return values, M-file, input-output statement.
8th week	Control Statements (Conditional statements: If, Else, Elseif, switch case).
9th week	Repetition statements: (While statement, For statement).
10th week	Procedures and Functions (A custom-made MATLAB function, define the name of the function, the input and the output variables, Calling Functions).
11th, 12th week	GUI Interface (Attaching buttons to actions, Getting Input, Setting Output), Predefined GUIs and Dialog Boxes.
13th, 14th, 15th week	Menu-driven programs: a) Controls: uimenu and uicontrol. b) Interactive graphics. c) Large program logic flow.
16th, 17th week	Introduces the LabVIEW environment including windows, menus, and tools.
18th, 19th week	Creating and using LabVIEW projects, The LabVIEW front panel and block diagram, Searching for controls, VIs, and functions.
20th, 21st week	Understanding the dataflow programming model of LabVIEW, Recognizing different data types, Tools for developing, cleaning, and organizing your VIs, Using Express VIs to build a basic VI.
22nd week	Correcting broken VIs, Using common debugging techniques, Addressing undefined or unexpected data, Implementing error checking and error handling.

23rd, 24th week	Using structures like the While Loop and For Loop, Adding software timing to your code, Sharing data between loop iterations, Plotting data to a waveform chart.
25th, 26th week	Creating and using array controls and indicators, Creating and using cluster controls and indicators, Using type definitions to improve reuse of data structures in applications.
27th, 28th week	Creating and using Case structures, Creating and using Event structures, Using a VI as a subVI, Creating subVIs from an existing VI.
29th, 30th week	High-level and low-level file I/O functions available in LabVIEW, Implementing File I/O functions to read and write data to files, Techniques for sequential programming, Using state programming, Implementing a state machine design pattern.

11. Assessment Method: Practical exams, theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any)

- "MATLAB: A Practical Introduction to Programming and Problem Solving" – Stormy Attaway
- "LabVIEW for Everyone: Graphical Programming Made Easy and Fun" – Jeffrey Travis & Jim Kring

Main References (Sources):

- "MATLAB Programming for Engineers" – Stephen J. Chapman
- "Hands-On Introduction to LabVIEW for Scientists and Engineers" – John Essick

Supporting Books and References (Scientific Journals, Reports...):

- IEEE Articles on the use of MATLAB and LabVIEW in biomedical engineering
- Studies and reports on the development of measurement systems using LabVIEW

Electronic References and Websites:

- MathWorks (MATLAB Official)
- NI (LabVIEW Official)
- MATLAB and LabVIEW courses on Coursera and Udemy

30	
1. Course Name or Topic:	English 3
2. Course Code:	MIT309
3. Semester / Year:	Third year
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	30
7. Course Instructor(s):	

8. **Course Objectives**: Learning new vocabulary related to different topics. Understanding and using different tenses such as the simple present and continuous, simple past and continuous.

9. **Teaching and Learning Strategies**:
   - **Research-Based Learning: Assign students to read and analyze research papers in medical engineering.**
   - **Collaborative Learning: Work in groups on research projects and presentations.**
   - **Problem-Based Learning: Study real medical and engineering cases to find appropriate solutions.**
   - **Listening & Observation Learning: Listen to scientific lectures and analyze them.**
   - **Experiential Learning: Write research reports and present results professionally..**

10. Course Structure

Week	Topic	Details
1st, 2nd	Review of Second-Year English	Revisiting technical writing, biomedical vocabulary, and professional communication.
3rd, 4th	Advanced Grammar for Academic and Technical Writing	Complex sentence structures, relative clauses, and advanced passive voice.
5th, 6th	Scientific Research Methodology	Writing research questions, hypotheses, and literature reviews.
7th, 8th	Medical Device Terminology	Understanding terminology related to medical equipment and devices.
9th, 10th	Critical Reading and Analysis	Techniques for analyzing scientific papers and extracting key information.
11th, 12th	Writing Scientific Papers	Structuring and writing full-length scientific research papers.
13th, 14th	Professional and Technical Correspondence	Writing reports, proposals, and formal communications.
15th, 16th	Listening to Medical and Engineering Lectures	Improving comprehension of technical lectures and discussions.
17th, 18th	Case Studies in Biomedical Engineering	Discussing real-world biomedical challenges and their solutions.
19th, 20th	Data Presentation and Interpretation	Describing and analyzing technical data, graphs, and research findings.
21st, 22nd	Engineering Documentation	Writing and reviewing user manuals, safety guidelines, and technical instructions.
23rd, 24th	Bioethics and Legal Aspects in Medical Technology	Discussing ethics, laws, and standards in biomedical engineering.
25th, 26th	Advanced Presentation Skills	Enhancing technical presentation skills with effective communication strategies.

27th, 28th	Research Paper and Technical Report Writing	Finalizing research projects and structuring technical reports.
29th, 30th	Final Project and Oral Presentation	Preparing and delivering a final research presentation.

11. Assessment Method: theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):

- Academic English for Engineers" – A book focusing on academic and engineering writing.
- "English for Biomedical Engineering" – A reference specialized in biomedical engineering terminology and technical communication

Main References (Sources):

- Scientific Writing: A Guide for Engineers and Scientists" – A comprehensive guide to scientific writing.
- "Handbook of Biomedical Engineering" – A book covering the fundamental principles of biomedical engineering.

Supporting Books and References (Scientific Journals, Reports...):

- Journal of Medical Devices" – A research journal containing the latest developments in medical devices.
- "Technical Communication: A Practical Approach" – A reference for teaching technical report writing and presentations.

Electronic References and Websites:

- "Google Scholar" – A search engine for scientific papers and academic articles.
- "PubMed" – A specialized database for medical and engineering research.

31	
1. Course Name or Topic:	Systematic training
2. Course Code:	MIT310
3. Semester / Year:	Third year
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	-
7. Course Instructor(s):	

8. **Course Objectives**Understanding Medical Devices: Study of the electrocardiogram (ECG) machine, cardiac resuscitation unit, cardiac catheterization device, and physical therapy devices. Operating and Maintaining Devices: Learn how to operate and maintain dental chairs and their accessories, electroencephalogram (EEG) machines, and echocardiography (ECO) devices.

9. **Teaching and Learning Strategies**:
   - **Practical Laboratory Training: Hands-on experience with medical devices.**
   - **Clinical Training: Hospital visits to observe devices in operation.**
   - **Workshops: Practical exercises on the use and maintenance of medical devices.**
   - **Problem-Based Learning: Analyzing device malfunctions and finding solutions.**
   - **Simulation-Based Learning: Using software to simulate real medical devices.**

10. Course Structure

Week	Topic
1 – 2	General Practical Training
3	Electrocardiogram (ECG) Machine, Cardiac Resuscitation Unit, and Cardiac Catheterization Device
4	Physical Therapy Devices and Their Types
5 – 6	Dental Chair and Accessories
7	Electroencephalogram (EEG) Machine, Echocardiogram (ECO) Device
8	Surgical Unit
9 – 10	Radiation Therapy Devices (Nuclear Medicine Unit)
11 - 12	Medical Laser Devices

32	
1. Course Name or Topic:	Medical Devices/3
2. Course Code:	MIT401
3. Semester / Year:	Fourth year
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	150
7. Course Instructor(s):	

8. **Course Objectives:** Understanding Medical Devices: Study of the medical device as a purely electronic device and understanding its differences from other electronic devices. Practical Training: Training on the internal electronic circuits of medical devices, their operation, and maintenance methods.

9. **Teaching and Learning Strategies**:
   - **Interactive Lectures: Theoretical explanation supported by practical examples.**
   - **Laboratory Practical Training: Hands-on use of surgical devices.**
   - **Simulation and Virtual Experiments: Training on devices using simulation software.**
   - **Problem-Based Learning: Studying clinical cases to identify the type of devices required.**
   - **Field Visits: Visiting hospitals and surgical centers to see devices in action.**

10. Course Structure

Week	Topic
1st-2nd	General Systems and Specialized Tools in General Surgery
3rd-5th	Specialized Systems and Tools
6th-7th	Surgical Instruments for Ophthalmology
8th-9th	Cardiovascular Surgery
10th	Heart-Lung Machine
11th-12th	Dialysis Machine
13th-14th	Surgical Diathermy
15th-17th	Prosthetic Organs (Internal and External)
18th-20th	Dental Systems
21st-22nd	Surgical Instruments for Gynecology
23rd-24th	Ultrasound-Assisted Devices
25th-26th	Hearing Surgery Systems
27th-28th	Anesthesia Units
29th-30th	Intensive Care Units

11. Assessment Method: Practical exams, theoretical exams, reports

12. Learning and Teaching Resources
Assigned Books (Curricular) if any):

- Surgical Instrumentation: An Interactive Approach" – Renee Nemitz
- "Biomedical Instrumentation and Devices" – Anthony Y. K. Chan

Main References (Sources)

- "Medical Instrumentation: Application and Design" – John G. Webster
- "Handbook of Biomedical Instrumentation" – R. S. Khandpur

Supporting Books and References (Scientific Journals, Reports...):

- Published research in IEEE Transactions on Medical Devices
- Articles on modern surgical device technologies

Electronic References and Websites:

- PubMed
- ScienceDirect
- Specialized training courses on Coursera and edX

33	
1. Course Name or Topic:	Control Systems
2. Course Code:	MIT402
3. Semester / Year:	Fourth year
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	120
7. Course Instructor(s):	

8. **Course Objectives**: Understanding control circuit components: Getting familiar with the components of control circuits, types of controllers, and their uses. Practical applications: Studying the practical circuits of controllers and how they are used in various systems.

9. **Teaching and Learning Strategies**:
   - **Interactive lectures: Presenting basic concepts with practical examples.**
   - **• Problem-solving training: Practical mathematical application to solve control problems.**
   - **• Simulation using software: Such as MATLAB and Simulink to analyze control systems.**
   - **• Case study analysis: Analyzing control systems used in medical and industrial applications.**
   - **• Project-based learning: Designing and implementing control systems using microcontrollers..**

10. Course Structure

Week	الموضوع
1st	Introduction to linear control engineering
2nd , 3rd	Mathematical background ; lap lace transform , complex variable , matrices
4th , 5th , 6th	Transfer function , block diagram representation and reduction , signal flow diagram
7th , 8th , 9th	Time domain analysis , steady – state transient analysis
10th , 11th	Stability analysis ; Routh , Nyquist
12th , 13th	Root locus technique
14th , 15th , 16th	Frequency domain analysis , Eainmargin , phase margin and bode plot
17th , 18th	Frequency domain synthesis , phase lead
19th , 20th	Compensation , phase – lag compensation lag – lead compensation
21st , 22nd , 23rd , 24th	PID controllers design
25th , 26th , 27th	State space representation and analysis
28th , 29th	State diagram ; analogue computer
30th	Block diagram representation

11. Assessment Method: Practical exams, theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):
- "Modern Control Engineering" – Katsuhiko Ogata
- "Automatic Control Systems" – Benjamin C. Kuo

Main References (Sources):
- "Control Systems Engineering" – Norman S. Nise
- "Linear System Theory and Design" – Chi-Tsong Chen

Supporting Books and References (Scientific Journals, Reports...):
- IEEE research on control systems
- Articles on control systems in medical and industrial devices

Electronic References and Websites:
- MIT OpenCourseWare – Control Systems
- MATLAB Documentation
- Coursera – Control Systems

34	
1. Course Name or Topic:	Radiation Device Engineering
2. Course Code:	MIT403
3. Semester / Year:	Annual
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	120
7. Course Instructor(s):	

8. **Course Objectives**: Understanding atomic structure and radiation: Study of atomic structure, nuclear radiation, and their effects on the human body. Uses of radiation in medical devices: Learning how radiation is used in various medical devices..

9. **Teaching and Learning Strategies**:
   - **Delivering theoretical lectures to explain the basic principles of radiation.**
   - **Conducting practical experiments in medical physics laboratories.**
   - **Analyzing medical cases involving the use of radiation in treatment and diagnosis.**
   - **Small research projects on modern radiation technologies.**
   - **Computer simulations to study the effects of radiation on tissues..**

10. Course Structure

Week	الموضوع
1st , 2nd	Atomic structure and atomic radiation
3rd , 4th	The nuclear and nuclear radiation
5th , 6th	Interaction of radiation with matter
7th , 8th , 9th	Radiation detection & engineering of radiation detectors
10th , 11th , 12th	Engineering of radiation dosimetry and dosimeters
13th , 14th	Radiation protection
15th , 16th	Engineering of body scanners
17th , 18th	Production of X – rays
19th , 20th	Clinical radiation generators
21st , 22nd	Dose distribution and scatter analysis
23rd , 24th	A system of dosimetric calculations
25th , 26th	Treatment planning
27th , 28th	Engineering of electron beam therapy
29th , 30th	Brachy therapy

11. Assessment Method: Practical exams, theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):
- Introduction to Radiological Physics and Radiation Dosimetry - Frank Herbert Attix

Main References (Sources):
- The Physics of Radiology - Harold Elford Johns

Supporting Books and References (Scientific Journals, Reports...):
- IEEE articles and research on medical radiation technology.

Electronic References and Websites:
- International Atomic Energy Agency (IAEA) – www.iaea.org
- RadiologyInfo – www.radiologyinfo.org

35	
1. Course Name or Topic:	Medical Laser Systems
2. Course Code:	MIT404
3. Semester / Year:	Fourth year
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	120
7. Course Instructor(s):	

8. **Course Objectives**: Understanding Laser Generation: Study how different types of lasers are generated. Laser Transmission and Reception: Learn the methods of laser transmission and reception. Using Lasers in Medical Devices: Understand how lasers are used in various medical devices.

9. **Teaching and Learning Strategies**:
   - **Lectures: Theoretical sessions to explain the basic principles of laser operation and optical fibers.**
   - **Practical Experiments: Conduct experiments on laser generation and its propagation through optical fibers.**
   - **Medical Applications Analysis: Study medical applications of lasers for diagnosis and treatment.**
   - **Mini Research Projects: Investigate the latest laser technologies in medicine.**
   - **Computational Simulation: Use computer simulations to analyze the effects of different parameters on light transmission in fibers.**
   - **.**

10. Course Structure

Week	topic
1st , 2nd	Laser generation
3rd , 4th	Types of laser
5th , 6th , 7th	Light and light propagation in glass fiber
8th , 9th , 10th	Optical fiber wave guide, bandwidth distance product, dispersion and pulse spreading, maximum allowable data rate, fiber power losses
11th , 12th	Transmitter device and circuits (communication LEDs)
13th , 14th	Injection lasers, modulators
15th , 16th	Receiver devices and circuits, photo diode light detector
17th	PIN photo diodes, photo multiplier
18th , 19th	Avalanche photo diode (APD), receiver circuits
20th , 21st	Transmission technology, fiber technology, connectors
22nd , 23rd	Splices, couplers
24th , 25th , 26th , 27th	Types of medical applications of laser
28th- 29th- 30 th	Laser hazards, the standard level for a safe working environment, lab safety

11. Assessment Method: Practical exams, theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):
- Principles of Lasers - Orazio Svelto

Main References (Sources):
- Fiber-Optic Communication Systems - Govind P. Agrawal

Supporting Books and References (Scientific Journals, Reports...):
- Laser Physics - Peter W. Milonni

Electronic References and Websites:
- Laser Institute of America – www.lia.org
- Optical Society of America – www.osa.org

36	
1. Course Name or Topic:	Advanced Digital Design
2. Course Code:	MIT405
3. Semester / Year:	Fourth year
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	120
7. Course Instructor(s):	

8. **Course Objectives**: Understanding Artificial Intelligence: Developing the ability to understand and design artificial intelligence systems. Microprocessor Technologies: Acquiring skills in microprocessor technology and VLSI systems.

9. **Teaching and Learning Strategies**:
   - **Applying theoretical concepts in the medical field: Encouraging students to apply the theoretical concepts they study to solve medical problems and design medical devices.**
   - **Teamwork and scientific research: Encouraging students to work together in scientific research projects and solve problems related to the course materials.**
   - **Using practical examples: Using practical examples to explain theoretical concepts and connect them to medical applications.**
   - **Continuous assessment: Continuously assessing students through practical and theoretical tests and research projects.**
   - **Encouraging creativity and innovation: Encouraging students to think critically and creatively in solving problems and developing new ideas in the field of medical device technology engineering..**

10. Course Structure

Week	Topic
1	Artificial Intelligence
2	Simulation and Modeling
3	Control System
4	Image Processing and Communications
5	Real-Time System
6	Microelectronics Technology
7	VLSI System
8	Topics in Electrical/Electronics Engineering
9	Advanced Computer Architecture
10	Topics in Computer Architecture
11	Robotics and Automation
12	Topics in Digital System
13	Advanced Logic Design
14 - 15	Topics in Computer Science
16 - 17	Digital Control System
18	Engineering Economic Analysis
19	Signal Processing
20	CAD/CAM
21	Reliability Engineering
22	Fault Diagnosis
23	Microcomputer System Design

24	Software Engineering
25	Parallel Processing
26	Operating System
27	Advanced Electronics
28	Maintenance Management
29	Nuclear & Radiation Equipment
30	Instruments & Operation Control

11. Assessment Method: Practical exams, theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):

- "Introduction to Artificial Intelligence" لـ Stuart Russell و Peter Norvig.
- "Simulation Modeling and Analysis" لـ Averill M. Law.
- "Modern Control Engineering" لـ Katsuhiko Ogata.

Main References (Sources):

- Artificial Intelligence: A Modern Approach".
- "System Simulation: Theory and Applications".
- "Control Systems Engineering

Supporting Books and References (Scientific Journals, Reports...):

- Scientific journals like "Journal of Artificial Intelligence Research."
- • Research reports on applications of course topics.
- • "IEEE Transactions on Control Systems Technology."

Electronic References and Websites:

- Websites like "AI Magazine."
- "arXiv.org."
- "Control Tutorials for MATLAB and Simulink)

37	
1. Course Name or Topic:	Project Management
2. Course Code:	MIT406
3. Semester / Year:	Fourth year
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	60
7. Course Instructor(s):	

8. **Course Objectives**: Acquiring essential skills: Learning how to design, plan, execute, and monitor projects. Problem-solving: The ability to identify project issues and find appropriate solutions using project management tools and methods..

9. **Teaching and Learning Strategies**:
   - **Using case studies to analyze real-world projects.**
   - **Applying collaborative learning through workgroups to solve scheduling and control problems.**
   - **Conducting hands-on simulations using software like Microsoft Project or Primavera.**

10. Course Structure

Week	Topic
1	Introduction to project management: Objectives and trade-offs (Cost – Schedule – Performance).
2	Planning and control in projects: Planning, Scheduling, Controlling.
3	Scheduling methods.
4	Gantt chart.
5	Network methods.
6	Constant-time network.
7-8	PERT network.
9-10	Critical Path Method (CPM).
11	Precedence Diagramming Method.
12-13	Project phases: Choice of project location.
14	Process design.
15	Choice of technology.
16	Financial analysis: Purchase of new machine, Machine replacement.
17	Layout of facilities.
18	Managing the workforce in projects: Who manages the workforce?
19	Principles in decision-making for workforce management.
20	Japan's workforce management.
21	New approaches to performance evaluation.
22	Materials handling: Concepts of MRP system.
23	Elements of MRP system.
24	MRP vs. Order-point system, MRP vs. Just-in-Time system.
25	Activities in projects: Coordination of project activities, Activity breakdown.
26	Measuring project progress tools.

27	Methods study.
28	Types of work measurement.
29	Time study.
30	Time management.

11. Assessment Method: Practical exams, theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):

- "Project Management: A Systems Approach to Planning, Scheduling, and Controlling" - Harold Kerzner.
- "A Guide to the Project Management Body of Knowledge (PMBOK Guide)" - PMI.

Main References (Sources):

- "Effective Project Management: Traditional, Agile, Extreme" - Robert K. Wysocki.
- "Managing Projects: A Team-Based Approach" - Karen Brown, Nancy Lea Hyer.

Supporting Books and References (Scientific Journals, Reports...):

- Journals such as "International Journal of Project Management."
- Reports from organizations like PMI (Project Management Institute).
- Books on scheduling techniques such as CPM and PERT.

Electronic References and Websites:

- PMI website (www.pmi.org) for project management resources.
- Online courses on LinkedIn Learning or Udemy on project management.
- Coursera website: Project Management courses (such as Google Project Management Certificate)

38	
1. Course Name or Topic:	Applications of Calculators
2. Course Code:	MIT407
3. Semester / Year:	Fourth year
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	90
7. Course Instructor(s):	

8. **Course Objectives**: Creating and formatting presentations. Creating and formatting text documents. Analyzing data and creating graphs. Creating, analyzing, and managing databases.

9. **Teaching and Learning Strategies**:
   - **Practical Application: Focus on implementing presentations and hands-on training with software.**
   - **Interactive Lectures: Presenting the material theoretically supported by explanatory presentations to simplify concepts.**
   - **Project-Based Learning: Assigning students to create presentations or practical projects using the discussed software.**
   - **Self-Training: Encouraging students to explore the features of the software independently and experiment with its different tools.**
   - **Discussions and Problem-Solving: Engaging students in discussions about the challenges they may face while using the software in practice..**

10. Course Structure

Week	Topic
1^{st} – 10^{th}	PowerPoint Program: Concept of the program and its benefits, how to run it, and its components. • Creating a New Presentation: Using templates provided by the program or working directly, saving the presentation, making edits, and saving changes. • Slide Layout: Adding a new slide (Slide) with text (Text) or graphics (Graphics), adding notes, and adding main titles. • Adding Drawings: Using available drawing tools to add graphics, modifying text, and controlling slide layout. • Controlling Slide Colors and Backgrounds. • Adding Clip Art: Methods for resizing, cutting, and controlling images, adding photos and controlling them, adding charts from Excel, or data sheets from Access databases. • Using Presentation Commands: Timing settings, slide transitions, animation effects, and adding sound effects for narration.
11^{th} – 30^{th}	Advanced Customization Applications for CAD-CAM:

11. Assessment Method: Practical exams, theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):

- Microsoft PowerPoint Guide – Official guide for Microsoft PowerPoint.
- CAD-CAM: Principles and Applications – A book on advanced applications in computer-aided design and manufacturing.

Main References (Sources):

- The Complete Guide to Microsoft PowerPoint" – A comprehensive book on all functions of the program.

- "CAD/CAM Theory and Practice" – A main reference outlining the fundamentals and software of CAD-CAM.

Supporting Books and References (Scientific Journals, Reports...):

- Specialized scientific journals in Information Technology.
- Research reports on the development of software in presentations and engineering design.

Electronic References and Websites:

- The official Microsoft website for updates and tutorials on PowerPoint.
- Educational courses on platforms like Coursera and Udemy to learn presentation techniques and CAD-CAM software.
- Specialized websites like ResearchGate and IEEE Xplore for accessing recent research on computer-aided design applications.

39	
1. Course Name or Topic:	Engilsh /4
2. Course Code:	MIT408
3. Semester / Year:	Fourth year
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	30
7. Course Instructor(s):	

8. **Course Objectives**: Developing English language skills in the field of biomedical engineering to facilitate effective communication in academic and industrial work environments. Equipping students with the essential medical and engineering terminology used in medical devices and healthcare technologies. Enhancing students' abilities in technical writing and scientific reports related to medical devices and modern technologies. Improving speaking and presentation skills through presenting projects and presentations on biomedical engineering topics. Introducing students to modern scientific and technological resources that support scientific research and practical applications in biomedical engineering.

9. **Teaching and Learning Strategies**:
   - **Interactive learning – using presentations and classroom discussions to enhance understanding and comprehension.**
   - **Project-based learning – assigning students practical projects related to medical devices and modern technologies.**
   - **Problem-based learning – analyzing case studies and technical challenges to solve engineering and medical problems.**
   - **Self-learning and research assignments – encouraging students to explore scientific resources and provide analytical reports.**
   - **Simulation and practical training – using software and virtual models to demonstrate the operation of medical devices and their technologies..**

10. Course Structure

Week	Topic	Details
1st, 2nd	**Review of Technical English & Research Writing**	Revisiting key biomedical terms, technical writing basics, and academic reading strategies.
3rd, 4th	**Advanced Scientific Writing**	Structuring research papers, writing abstracts, and citing sources properly.
5th, 6th	**Medical Device Regulations & Standards**	Understanding FDA, ISO, and CE regulations related to biomedical devices.
7th, 8th	**Patent Writing and Intellectual Property**	Learning how to write and analyze patents for biomedical inventions.
9th, 10th	**Literature Review & Research Methodology**	Techniques for conducting literature reviews and summarizing key findings.
11th, 12th	**Clinical and Technical Documentation**	Writing clinical reports, user manuals, and technical specifications for devices.
13th, 14th	**Ethics in Biomedical Engineering**	Understanding bioethics, patient safety, and ethical considerations in research.
15th, 16th	**Scientific Presentation & Public Speaking**	Developing and delivering professional research presentations.
17th, 18th	**Biomedical Case Studies & Innovations**	Analyzing real-world case studies in medical device development.

19th, 20th	**Regulatory Compliance and Risk Assessment**	Writing risk analysis reports and regulatory compliance documents.
21st, 22nd	**Data Analysis & Interpretation in Research**	Understanding statistical reports, graphs, and interpreting experimental results.
23rd, 24th	**Medical Research Proposal Writing**	Structuring and writing research proposals for funding applications.
25th, 26th	**Professional Communication & Industry Reports**	Writing professional emails, reports, and business proposals in the biomedical industry.
27th, 28th	**Peer Review & Scientific Criticism**	Analyzing and critiquing scientific papers effectively.
29th, 30th	**Final Research Paper & Oral Defense**	Preparing the final research paper and practicing for oral defense presentations.

11. Assessment Method: Practical exams, theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):

- English for Medical and Engineering Purposes
- Technical English for Biomedical Engineers
- Medical Terminology for Health Professions

Main References (Sources):

- Handbook of Biomedical Engineering
- Introduction to Biomedical Technology
- Engineering in Medicine: Principles and Applications

Supporting Books and References (Scientific Journals, Reports...):

- Scientific journals: IEEE Transactions on Biomedical Engineering
- Reports: World Health Organization (WHO) reports on medical devices
- Research: Research published in PubMed and ScienceDirect

Electronic References and Websites:

- Educational websites: Coursera, edX (Courses on biomedical engineering and technical English)
- Scientific databases: PubMed, ScienceDirect, IEEE Xplore
- Academic platforms: ResearchGate, Google Scholar

40	
1. Course Name or Topic:	Professional Ethics
2. Course Code:	MIT409
3. Semester / Year:	Fourth year
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	60
7. Course Instructor(s):	

8. **Course Objectives**: Understanding the Concept and Importance of Ethics: Students learn the concept of ethics and its significance in both professional and personal life. Applying Ethics in the Workplace: Students acquire skills to apply professional ethics in their work environment.

9. **Teaching and Learning Strategies**:
   - **problem-Based Learning: Encouraging students to analyze ethical dilemmas in medical and engineering professions and develop practical solutions to uphold ethical values in workplaces.**
   - **Interactive Learning: Using group discussions and presentations to enhance communication among students on ethical issues in engineering and medical fields.**
   - **Experiential Learning: Implementing simulations of real work environments to familiarize students with daily professional challenges and ethical decision-making.**
   - **Project-Based Learning: Assigning group projects focused on promoting and applying professional ethics in engineering and medical fields.**
   - **Self-Directed Learning: Encouraging students to conduct independent research on ethical topics relevant to their field through case studies and academic articles.**

10. Course Structure

week	Details of the Topics:
1 – 2	The concept of ethics and its origin. - General rules of ethics. - Sources of ethics. - Ethical values. - The importance of ethics for individuals and society.
3 – 4	Unit Two - Work and Profession. - Work and its importance. - Work behaviors. - The concept of profession. - Definition of profession. - The difference between the concepts of work, profession, and craftsmanship. - The foundations upon which a profession should be built.
4 – 5	Unit Three - Professional Ethics. - The nature of professional ethics. - The positive outcomes of adhering to professional ethics. - Characteristics of work ethics. - Attributes of professional ethics. - Steps to achieving an acceptable level of professional ethics.
5 – 6	Unit Four - Values and Professional Ethics. - Honesty. - Advising. - Justice. - Good conduct. - Work proficiency.
7 – 10	Unit Five - Unethical Behavior Patterns in the Profession. - Bribery. - The concept of bribery. - Types of bribery. - The difference between gifts and bribery. - The reasons and motivations behind bribery. - Fraud. - The concept of fraud. - The nature of fraud in the workplace. - Manifestations of fraud in job performance. - Administrative corruption. - Definition of administrative corruption. - Types of administrative corruption. - Unethical administrative behavior.
10- 13	Unit Six - Professional Ethics. - How to enhance ethical behavior at work according to (Kreiner & Kinicki). -

	Considerations when drafting a professional ethics charter. - Means and methods of establishing professional ethics. - Levels of building and reinforcing professional ethics. - Methods of instilling professional ethics values.
14 – 18	Unit Seven - Ethics of Arab Engineers. - The importance of fundamental pillars of the engineering profession charter. - The relationship of the engineer with their institution and engineering work. - The relationship of the engineer with the employer. - The relationship of the engineer with the engineering world and the engineering association they belong to. - The role of the engineer and their relationship with society. - The engineer's relationship with the environment, sustainable development, health, and public safety. - The engineer's relationship with laws, regulations, labor laws, and workers' rights. - The engineer's relationship with national, regional, and humanitarian issues.
19 – 22	Unit Eight - Engineering Professional Ethics (specific to technical engineering colleges). - The importance of engineers in society. - Definition of engineering ethics. - Conditions for a professional engineer. - Attributes of a professional engineer. - Examples of certain provisions of the engineering profession practice regulation in the Engineers' Syndicate. - The Islamic perspective on professional ethics compared to Western and American views.
23 – 24	Unit Nine - Ethics of Practicing the Engineering Profession. - The importance of engineers in society. - Definition of engineering ethics. - Conditions for a professional engineer. - Attributes of a professional engineer. - Examples of certain provisions of the engineering profession practice regulation in the Engineers' Syndicate. - The Islamic perspective on professional ethics compared to Western and American views.
24 – 25	Unit Nine - Ethics of Practicing the Medical Profession (specific to the College of Health and Medical Technology). - Characteristics and attributes of a medical technician. - Duties of the medical technician towards their profession, patients, and society.
26 – 27	Patient Rights. - Justice and equality. - Maintaining patient confidentiality. - Informed consent. - Comprehensive care. - Placing the patient's interest above all considerations. - Effective communication with patients. - The right to access medical records.
28 – 29	Professional Relationships: The relationship of the medical technician with colleagues in the healthcare institution. - Respect, cooperation, avoiding criticism in front of patients, accuracy, and honesty in performance.
30	Ethics and Medical Research: - Ethics of conducting medical experiments in Iraqi healthcare institutions. - The Helsinki Agreement on medical experiment ethics. - Ethics of writing medical research. - Ethics of teaching and learning through patients.

11. Assessment Method: Practical exams, theoretical exams, reports

12. Learning and Teaching Resources

Assigned Books (Curricular) if any):

- Ethics in the Medical and Engineering Professions – A textbook covering the principles of ethics in medical and engineering fields.
- Work and Profession in Medical Engineering – A book explaining the differences between work and profession in the engineering and medical contexts.
- Medical Professional Ethics – A guide addressing the ethical aspects of medical practice

Main References (Sources):

- Handbook of Medical Ethics – A primary reference on medical ethics.
- Engineering Ethics: Concepts and Cases – A key book explaining engineering ethics with case studies.
- The Ethics of Healthcare Technologies – A reference linking ethics and medical technology.

Supporting Books and References (Scientific Journals, Reports...):

- IEEE Transactions on Biomedical Engineering – Specialized journals in scientific research and ethics in biomedical engineering.
- Ethics in Medicine Journal – Professional journals focusing on ethical topics in medicine.
- World Health Organization (WHO) Reports – Periodic reports on healthcare ethics at the international level.

Electronic References and Websites:

- PubMed – A research database in medicine and medical ethics.
- IEEE Xplore – An academic library for scientific research in biomedical engineering.
- Google Scholar – An academic search engine for papers and research related to ethics in

41	
1. Course Name or Topic:	project 1
2. Course Code:	MIT410
3. Semester / Year:	Fourth year
4. Date of Preparation:	5/2/2025
5. Available Attendance Formats:	In-person
6. Total Hours:	180
7. Course Instructor(s):	

8. **Course Objectives**: Self-Reliance: Developing self-reliance skills to demonstrate scientific competence. Setting and Analyzing Goals: The ability to identify key project goals and analyze work steps.Teamwork: Learning how to collaborate with a group of students to support teamwork..

9. **Teaching and Learning Strategies**:
   - **Project-Based Learning: Encourages students to apply acquired skills and knowledge while implementing practical projects, enhancing critical thinking and problem-solving.**
   - **Collaborative Learning: Through cooperation with supervisors and peers, knowledge and feedback are exchanged to improve the project.**
   - **Self-Directed Learning: Students conduct independent research and use electronic resources and prescribed books to obtain additional information supporting their project.**
   - **Hands-On Learning: By conducting experiments and testing models practically, students enhance their understanding of theoretical materials and achieve real-world results.**
   - **Continuous Assessment: Evaluating students at each stage of the project, allowing them to adjust and improve their projects based on feedback..**

10. Course Structure

Week	Vocabulary
1	Assigning projects to students, reviewing with the supervising professor, and starting library research. Collecting information about the project, beginning theoretical study, and preparing the necessary designs.
2	Starting the implementation of proposed designs practically, conducting experiments and tests to obtain the practical model.
3	Conducting practical experiments, testing final board transfers, and obtaining final project results.
4	Discussing practical results, their alignment with real-world outcomes, and identifying necessary modifications to improve the phenomenon.
5	Organizing sections of the written report for each stage of the project in preparation for the final report. Submitting the final report in detail: • Project name. • Student's name. • Supervisor's name. • Chapter One: Introduction. • Chapter Two: Theoretical section. • Chapter Three: Practical section and results. • Chapter Four: Discussion of results, conclusions, and recommendations. • References.
6	Delivering the practical project model along with the final report for final testing and evaluation.

11. Assessment Method: Theoretical exams, reports.

12. Learning and Teaching Resources

Recommended Textbooks (if available):

- Scientific Research References: Books focusing on the fundamentals of scientific research and precise project preparation.
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- Guide to Writing Academic Reports: A book explaining how to professionally structure and write scientific project reports.
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- Books on Engineering Project Design and Implementation: Including resources on designing medical devices, testing them, and analyzing results.

Main References (Sources):

- Scientific Research in Biomedical Engineering: A reference explaining how to conduct scientific research in the field of medical devices.
- The Complete Guide to Writing Research Reports: A primary resource for writing scientific research reports.
- Practical Engineering Projects in Biomedical Engineering: A reference highlighting how to apply designs in the field of medical devices.

Supporting Books and References (Journals, Reports, etc.):

- IEEE Transactions on Biomedical Engineering: Provides scientific research papers related to biomedical engineering technologies.
- Journal of Medical Engineering & Technology: A journal specializing in biomedical engineering technologies and related research.
- World Health Organization Reports: Reports that contribute to understanding health and technical issues that may impact engineering projects.

Electronic References and Websites:

- PubMed: A database offering research papers in medicine and biomedical engineering.
- IEEE Xplore: An academic library containing scientific articles and research related to biomedical engineering.
- Google Scholar: An academic search engine that students can use to find scientific papers and articles on biomedical engineering topics