Engineering Program

Specialization	Medical Equipment Technology
Course Number	20411141
Course Title	Advanced Engineering Workshop
Credit Hours	2
Theoretical Hours	0
Practical Hours	6

Brief Course Description:

- ❖ Introduction to general safety precautions involving the safe installation of different types of workshop equipment to operate the workshop machines safely.
- ❖ Introduction to cutting and machining operations using different types of machines such as drilling, turning, and milling machines.
- ❖ Introduction to Oxy-acetylene gas welding and arc welding .
- ❖ Introduction to General refrigeration cycle (GRC), Type of refrigeration gases and Refrigeration unit.

Course Objectives:

At the end of this course student will be able to:

1. Identify safety hazards.
2. Identify and use common hand tools and power tools.
3. Understand the principles of metal cutting operations.
4. Recognize and understand the principles of operation of lathe machines, drilling machines, and milling machines .
5. Understand lines, views, and dimensions of weld joint configurations and weld symbols.
6. Understand the principles of Oxy-acetylene gas welding , and proper setup of equipment and applications.
7. Understand the principles of arc welding ,Identify welding equipment and applications.
8. Understand the principles of General refrigeration cycle (GRC), Type of refrigeration gases and Refrigeration unit.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1	Health and safety	▪ General safety precautions and fire prevention. ▪ Personal protective equipment needed. ▪ Measures required in the use of different types of welding. ▪ Other safety components involve the safe installation of different types of workshop equipment to operate the workshop machines safely. ▪ Information and some basic personal first aid knowledge.	3
2	Hand Tools and Power Tools	▪ Introduction to Hand Tools ▪ Introduction to Power Tools.	3
3	Drilling	▪ Introduction to drilling machine, Purpose, uses and safety precautions. ▪ Tool holding. ▪ Cutting tools on drilling machine. ▪ Drilling operations. ▪ Drilling sheet metal. ▪ Drilling plastics. ▪ Sharpening of twist drills ▪ Reaming.	9
4	Turning	▪ Different types of lathes and their components. ▪ Cutting tools. ▪ Mounting of work pieces on lathes Longitudinal, face, and internal turning ▪ Taper turning. ▪ Internal and external thread cutting. ▪ Eccentric Turning.	24
5	Milling	▪ Types of milling machine. ▪ Principal parts of milling machine. ▪ Milling machine operations. ▪ Milling machine controls & adjustments. ▪ Milling tools and holders. ▪ milling machine options and accessories.	6

6	Fundamentals of welding	▪ Selecting the appropriate welding process, metallurgy mechanical and physical properties of metals, types of joints, types of welding position, welding problems, producing good welds.	3
7	Introduction to oxy-acetylene gas welding.	▪ Gases used in oxy-acetylene gas welding. ▪ Gas welding rods and fluxes, oxygen and acetylene cylinders, welding Torches, gas pressure regulators. ▪ Protective clothing and safety rules.	3
8	oxy-acetylene gas welding Process	▪ Types of welding joints. ▪ Assembly of equipment ▪ Flame characteristics ▪ Welding Techniques ▪ Welding defects	9
9	Introduction to Arc welding	▪ Arc welding Equipment and supplies, welding power sources, DC and AC, electrodes, …etc.	6
10	Arc welding process	▪ Selecting a power source, the electric arc, the required current, the proper electrode, polarity, welding positions, types of joints, weld preparation, welding problems.	9
11	Refrigeration	▪ Introduction to refrigeration ▪ General refrigeration cycle (GRC) ▪ Mechanical and electrical parts of GRC ▪ Follow and test the mechanical parts of GRC ▪ Type of refrigeration gases ▪ Refrigeration unit ▪ Welding copper pipes in refrigeration units ▪ Common troubleshooting and maintenance of refrigeration unit.	9

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam		--/--/----
	Second Exam		--/--/----
	Med-Term Exam	30%	
	Final Exam	50%	--/--/----
Homework and Projects		20	
Discussions and lecture presentations			

Teaching Methodology:

- Lectures
- Video Lectures

Text Books & References:

Text Book:

1. Workshop technology by W.A.J. Chapman (versions 1,2,and 3).
2. Manufacturing Engineering and technology, 5th edition, Serope Kalpakjian and Steven R. Schmid, 2006 by Pearson Education, Inc Pearson Prentice Hall USA.

References:

1. Manufacturing Processes and systems. Last edition, Phillip F Ostwald and Jairo Munoz, Copyright. 1997 by John Wilely and sons.
2. Production Technology last edition, HMT Bangalore, Taate Mc Graw – Hill Publishing Company.
3. Welding craft practice, 2 nd edition, Volume 1,by N.Parkin and C.R.Flood
4. Refrigeration & air Conditioning , 2 nd edition , Wilbert F.Stoecker / Jerold W. Jones , Mc Graw – Hill international editions.

Engineering Program

Specialization	Medical Equipment Technology
Course Number	20411121
Course Title	Advanced Physics
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Brief Course Description:

- The physical concepts to be studied in this course includes: The Magnetic Field, and the Faraday's Law of Induction, inductance ,and alternating current circuits

Course Objectives:

By the end of the course the students should be able to:

1. Become familiar with the physical concepts in magnetism.
2. Apply faraday laws.
3. Provide a description of how to solve a problem, justifying their choices.
4. Become familiar with the physical concepts of inductance
5. Understand what the AC source is.
6. Understand what the RLC circuit is.
7. calculate power and energy in AC circuit

Unit Number	Unit Name	Unit Content	Time Needed
1.	MAGNETIC FIELDS	▪ The Magnetic Field and Forces. ▪ Motion Of a Charged Particle In a Uniform Magnetic Field ▪ Magnetic Force On a Current-Carrying Conductor ▪ Torque On a Current Loop In a Uniform Magnetic Field ▪ Application Involving Charged Particles Moving In a Magnetic Field ▪ The Hall Effect	9
2.	SOURCES OF THE MAGNETIC FIELF	▪ The biot-savart law ▪ The magnetic force between two parallel conductors ▪ Ampere's law ▪ The magnetic field of a solenoid ▪ Gauss's law in magnetism ▪ The magnetic field of the earth	7
3.	FARADAY'S LAW	▪ Faraday's Law Of Induction ▪ Motional emf ▪ Lenz's Law ▪ Induced emf And Electric Fields ▪ Generator and motors ▪ Eddy current	7
4.	INDUCTANCE	▪ Self-Induction And Inductance ▪ RL Circuits ▪ Energy In Magnetic Field ▪ Mutual Inductance ▪ The RLC Circuit	8
5.	ALTERNATING CURRENT CIRCUITS	▪ Ac Sources ▪ Resistor In an AC Circuit ▪ Inductor In an AC Circuit ▪ Capacitor In an AC Circuit ▪ The RLC Series Circuit ▪ The RLC parallel Circuit ▪ Power In an AC Circuit ▪ Resonance in a series RLC circuit ▪ The transformer and power transmission ▪ Rectifiers and filters	11

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	25%	--/--/----
	Second Exam	25%	--/--/----
	Med-Term Exam		
	Final Exam	40%	--/--/----
Homework and Projects		10%	
Discussions and lecture presentations			

Teaching Methodology:

- Lectures-boards

Text Books & References:

Text Book:

1. Raymond A. Serway and John W. Jewett, "Physics for scientists and Engineers", 7th edition, Thomson Brooks Publisher, 2007.

References:

1. David Halliday, Robert Resnick, and Jearl Walker, "Fundamentals of Physics
   Extended", 8th edition, John Wiley & Sons, 2008.

Engineering Program

Specialization	Medical Equipment Technology
Course Number	20411386
Course Title	Analytical And Diagnostic instrumentation
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Brief Course Description:
Students should acquire a theoretical knowledge of the technical aspects of some of the medical equipment ; Electro-cardiograph "ECG, Medical Laboratory Equipment , Sterilization in Hospitals

Course Objectives:
Upon the completion of the course, the student will be able to:

1. Introduction into uses and ways of Measurements equipment.
2. Professional work concept.
3. Parts and circuits of the major electric circuits.
4. Electric safety.
5. Preventive maintenance and calibration.
6. Possible defects.
7. Define and repair the defects using the proper examining equipment.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1	Electro-cardiograph "ECG"	▪ Describe the fundamentals of an ECG recording. ▪ Describe the basic ECG machine. ▪ Draw and describe the basic lead system. ▪ List the causes and cures for most ECG recording malfunctions. ▪ List the basic maintenance procedures for the ECG machine.	12
2	Medical Laboratory Equipment	▪ State the purpose of blood. ▪ List the components and describe the composition of blood. ▪ List and describe blood tests (cells and chemistry) ▪ State the purpose, uses, principle of operation, and maintenance of the following blood instrumentation: Hematology Analyzers, Blood Gas Analyzers (pH, Po_2, and Pco_2), Centrifuge, Microscope, and Auto Analyzers (1) which includes: Chemistry Analyzers and Pathogen Identification Analyzers. ▪ Auto analyzers (2) which includes: Coagulation (Fully Automated and Semi Automated), Bacteriology, Hormone, PCR (Poly Chain Reaction), Hemoglobin, and Electrophoresis Testing.	15
3	Sterilization in Hospitals	▪ Describe the operating principles of several types of sterilizers. ▪ Recommend procedures for sterilizing, and disinfecting a range of patient-	15

		associated equipment. ▪ Recognize simple sterilizer fault situation and take remedial action.	

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	20%	--/--/----
	Second Exam	20%	--/--/----
	Med-Term Exam		
	Final Exam	40%	--/--/----
Homework and Projects		10%	
Discussions and lecture presentations		10%	

Teaching Methodology:

- ❖ Lectures
- ❖ Video Lectures

Text Books & References:

References:

1. Introduction to Biomedical Equipment Technology, Joseph J. Carr and John M. Bro,N-n, John Wiley, 1981.
2. Introduction to Biomedical Electronics, Joseph DuBo-,y, Mc Grain-Hill, 1987.
3. Bioelectronic Measurements, Dean Al DeMarre & David Michaels, Prentice Hall, 1983.
4. Servicinc Medical and Bioelectronic Equipment, Josephine J. Carr, Tab Books Inc.
5. Biophysical Measurements, Peter Strong, TeKtronix Inc., 1970.
6. Biomedical Instrumentation and Measurements, Dean A. DeMarre and David Michaels, Prentice Hall, 1980

Engineering Program

Specialization	Medical Equipment Technology
Course Number	20411387
Course Title	Analytical And Diagnostic instrumentation lab
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Brief Course Description:

Students should acquire a practical knowledge of the technical aspects of some of the medical equipment ; Electro-cardiograph "ECG, Medical Laboratory Equipment , Sterilization in Hospitals

Course Objectives:

Upon the completion of the course, the student will be able to:

8. Introduction into uses and ways of Measurements equipment.
9. Professional work concept.
10. Parts and circuits of the major electric circuits.
11. Electric safety.
12. Preventive maintenance and calibration.
13. Possible defects.
14. Define and repair the defects using the proper examining equipment.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1	Electro-cardiograph "ECG"		12
2	Medical Laboratory Equipment		15
3	Sterilization in Hospitals		15

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	20%	--/--/----
	Second Exam	20%	--/--/----
	Med-Term Exam		
	Final Exam	40%	--/--/----
Homework and Projects		10%	
Discussions and lecture presentations		10%	

Teaching Methodology:

- Laboratory

Text Books & References:

References:

7. Introduction to Biomedical Equipment Technology, Joseph J. Carr and John M. Bro·,N-n, John Wiley, 1981.
8. Introduction to Biomedical Electronics, Joseph DuBo-·,·y, Mc Grain-Hill, 1987.
9. Bioelectronic Measurements, Dean Al DeMarre & David Michaels, Prentice Hall, 1983.
10. Servicinc· Medical and Bioelectronic Equipment, Josephine J. Carr, Tab Books Inc.
11. Biophysical Measurements, Peter Strong, TeKtronix Inc., 1970.
12. Biomedical Instrumentation and Measurements, Dean A. DeMarre and David Michaels, Prentice Hall, 1980

Engineering Program	
Specialty	Medical Equipment Technology
Course Number	**20411111**
Course Title	Applied Mathematics
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Brief Course Description:

- Students should Understand the concept of complex number and mathematical applications, Resolve cubic, square and other equations of complex roots, Apply de moiver's theorem and concept of sequences and series, understand the concept of convergence and divergence experiments on series, Identify tailors and Fourier's series and some functions.

Course Objectives:

Upon the completion of the course, the student will be able to:

15. Understand the concept of complex number
16. Execute mathematical applications on complex numbers
17. Represent complex numbers and there application in graphic representations
18. Resolve cubic , square and other equations of complex roots
19. Apply de moiver's theorem to find the square root of complex number
20. Understand the concept of sequences and series, and differentiate between them
21. Identify the different types of series
22. Find the limit and sum of some series
23. Understand the concept of convergence and divergence experiments on series
24. Identify tailors series & maclaurin's theorem in one variable
25. Identify tailors series for functions
26. Identify Fourier's series and integral
27. Find Fourier series for some functions

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1	Complex Numbers	▪ concept of complex numbers , real numbers & imaginary numbers (..) two consecutive complex numbers , two equal complex numbers ,resolving square equations of complex root ,analyzing some algebraic forms ▪ representing some complex numbers in the complex level (argand diagram) , polar form of complex numbers ,modulus and amplitude of complex numbers ▪ operations on complex numbers : addition, subtraction and graphic representation of complex numbers .multiplication of complex numbers and there graphic representation, division of two complex numbers and there graphic representation ▪ de moivers theorem, square root of complex numbers	**12**
2	Series and sequences	▪ Concept of series and chains, definite and infinite series .limit and sum of a series ▪ Types of series: numeric (arithmetic) series ,geometric series ,infinite geometric series , combination series ,non negative limit series, square series and alternating series ▪ Convergence, divergence and amplitude of infinite series: convergence and divergence experiment , in root espirement,integration experiment and alternating limits experiment)absolute and conditional	**12**

		convergence ▪ Tailors series & maclaurins theorem	
3	Fourier's series and integrals	▪ Definition of Fourier series ▪ Finding Fourier's functions ▪ Finding function components using furriers series ▪ Cyclic functions, signal and binary functions ▪ Descartes rules in Fourier series convergence, sine and cosine series ▪ Definition of Fourier integral , Fourier integral theorem	**9**
4	**Laplace's integral**	▪ Definition and characteristics of laplaces integral ▪ Laplaces transformation of simple function (algebraic, trigonometric and exponential) ▪ Laplace's transformation of first and second derivatives as well as the higher derivatives of the function ▪ Solving the differential equations of certain constant and primary coefficients using laplaces transformation	**10**

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	25%	--/--/----
	Second Exam	25%	--/--/----
	Med-Term Exam		
	Final Exam	40%	--/--/----
Homework and Projects		10%	
Discussions and lecture presentations			

Teaching Methodology:

- Lecture- Board

Text Books & References:

1. Calculus and analytic geometry , George B.thomas Jr.ross & L.finney
2. Calculus with analytic geometry, earol W.swokoeiski
3. Calculus , Stanley M.Grossnan
4. Fourier series and boundary value problems, Churchill, ruel vance

Engineering Program

Specialization	Medical Equipment Technology
Course Number	20411261
Course Title	Basics of Electronics
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Brief Course Description:

- This course covers the basic subjects in electronics and you will study: Semiconductor theory , the diode , special purpose diodes , diode applications , bipolar junction transistor (BJT) , field effect transistor (FET) , operational amplifiers, thyristor and other devices.

Course Objectives:

Upon the completion of the course, the student will be able to:

1. Explain the basic structure of atoms.
2. Define and discuss semiconductors, conductors, insulators .
3. Identify the bias and applications of diode, zener ,varactor, and other special diodes.
4. Study of BJT & FET ,oscillators ,operational amplifiers, thyristors and other devices

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Introduction to Semiconductors	▪ Atomic structure ▪ Semiconductors ▪ Conductors ▪ Insulators ▪ Covalent bonds ▪ Conduction in semiconductors ▪ Intrinsic and extrinsic semiconductors ▪ N-type and p- type semiconductors	5
2.	The Diode	▪ P-N junction ▪ Biasing the diode ▪ Voltage – current characteristic of diode ▪ DC load line ▪ Operating point ▪ DC and AC resistance ▪ Comparison between silicon and germanium diodes ▪ Data sheet of diode	6
3.	Special – Purpose Diode	▪ Zener diode (symbol , structure , principle of operation ▪ Zener diode applications (regular and limiter) ▪ Varactor diode. Light- emitting diode (LED), photodiode	5
4.	Applications of The Diode	▪ Half – wave and full – wave rectifiers ▪ Filters and regulators in power supply circuits.	3
5.	Bipolar Junction Transistor (BJT)	▪ Introduction ▪ Structure and principle of operation ▪ Characteristics and parameters. ▪ Regions of operation ▪ The DC operation point)load line) ▪ BJT as an amplifier and as switch ▪ Voltage divider bias and other bias methods ▪ Basic circuits connection ▪ (C.E, C.C, C.B) amplifier ▪ Data sheet of a BJT	6

6.	Field – Effect Transistor(FET)	▪ Introduction. ▪ Structure and principle of operation of junction field effect transistor (JFET). ▪ JFET characteristics, Parameters and biasing. ▪ Structure and principle of operation of metal oxide semiconductor field effect transistor (MOSFET). ▪ Enhancement and depletion types. ▪ MOSFET characteristics, Parameters and biasing. ▪ FET amplification, connections modes (C.S, C.D, C.G,) amplifiers, data sheet of a JFET and a MOSFET.	5
7.	Oscillators	▪ Introduction ▪ Negative and positive feedback, (basic circuit, principle of operation, oscillation frequency calculation for the following oscillators. Phase – shift oscillator ▪ Colpitts and Hartley oscillators	3
8.	Operational Amplifiers	▪ Symbol, terminals and basic op-amp representations (idea and practical)	3
9.	Thyristor and Other Devices	▪ Structure ,principle of operation ▪ Characteristics curves and applications of the following devices: (Four – layer device, SCR (Silicon – controlled rectifier), siac, triac, Uninjunction transistor (UJT), and phototransistor	3
10.	Introduction to Electronic Measurements	▪ Applications of oscilloscope in electronic measurements	3

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	25%	--/--/----
	Second Exam	25%	--/--/----
	Med-Term Exam		
	Final Exam	40%	--/--/----
Homework and Projects		10%	
Discussions and lecture presentations			

Teaching Methodology:

- Lecture- Board

Text Books & References:

Text Book:

1. Thomas L. Floyd, electrical devices, prentice hall international, 6th edition , 2002.

References:

1. Basic operational Amplifiers and Linear Integrated Circuits , David Buchla ,Prentice Hall , 1999.
2. Electronics fundamental and Experiments, Cynthia B. Leshin, David Buchla, Tjomas L. Floyd, prentice hall international ,1999.

Engineering Program

Specialization	Medical Equipment Technology
Course Number	20411262
Course Title	Basics of Electronics Lab.
Credit Hours	1
Theoretical Hours	0
Practical Hours	3

Brief Course Description:

- Lab in support of the basic electronics course, experiments in basic electronics have to cover all electronics devices (diode, zener diode, diode applications, BJT,op – amp ,oscillators ,SCR).

Course Objectives:

Upon the completion of the course, the student will be able to:

1. Become familiar with electronics devices and using data sheet.
2. Demonstrate how to test electronic devices by using AVO meter or through DC measurements.
3. Construct electronic circuit.
4. Investigate characteristics curves.
5. Calculate the value the values of currents and voltage and compare them with measured values

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1	The diode		6
2	Zener diode		
3	Rectification Circuits with Filter and Regulator		3
4	Testing BJT		
5	A BJT with Voltage – Divider Bias		3
6	Using BJT as a switch		
7	Common Emitter Amplifier Circuit		3
8	Common collector Amplifier circuit		3
9	Common Base Amplifier Circuits		3
10	Common source Amplifier Circuits		3
11	Operational Amplifier as Inverting and Noninverting Amplifier		3
12	Operational Amplifier as Differentiator and Integrator		3

13	RC phase-shift Oscillator		3

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam		--/--/----
	Second Exam		--/--/----
	Med-Term Exam	20%	
	Final Exam	50%	--/--/----
Homework and Projects		30%	
Discussions and lecture presentations			

Teaching Methodology:

- Laboratory

Text Books & References:

Text Book:

1. Instructional Lab. Sheets
2. Thomas L. Floyd – " Principles of electric circuits" Electron flow version - prentice hall International – eighth edition 2006

References:

1. Robert L. Boy listed - Introductory circuit analysis - prentice hall International 1997.
2. Experiments in electronics Fundamentals and electric circuits fundamentals – David Buchla -. prentice hall 2000.

Engineering Program	
Specialty	Medical Equipment Technology
Course Number	20411271
Course Title	Computerization Techniques
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Brief Course Description:

- Study of computer history, development and current boom and versatility with an emphasis on the use of computer hardware and software in medical equipment and Hospital information systems.

Course Objectives:

Upon the completion of the course, students will have adequate knowledge of the following:

1. The history of computing and computers.
2. Microcomputer and basic architecture.
3. Microprocessors and microcontrollers.
4. Operating Systems.
5. Computer Networks.
5. Various computerization techniques in terms control, processing of information, communication, and archiving.
7. Hardware maintenance.
8. Software maintenance.
9. Security Issues backup techniques.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed(hr)
1	Introduction to Computers	▪ History of computing & computers ▪ Classes of computers. ▪ Hardware and Software. ▪ Computer Applications.	3
2	Basic Architecture	▪ Binary numbers ▪ Primary and secondary storage (RAM and HDD) ▪ The motherboard. ▪ The Microprocessor (CPU) ▪ Communication busses. ▪ Communication Ports. ▪ Graphics card and other add-on cards. ▪ Input & output devices (peripherals) ▪ BIOS.	12
3	Electricity & Power supply	▪ Electricity ▪ Power supply ▪ ESD ▪ Protection & safety . ▪ Form factor.	3
4	Memories & Microprocessors	▪ Microprocessor Instructions sets. ▪ Microprocessor architectures. ▪ Type of memory.	3
5	Operating Systems	▪ How hardware & software work together ▪ Function of OS's. ▪ Windows, Unix,lunix ▪ Embedded OS's	6
6	Computerization Techniques	▪ Databases and spreadsheets. ▪ PC based Systems. ▪ Embedded Systems.. ▪ Subsystems and networking..	3

7	Introduction to Computer Networks	▪ Introduction. ▪ Scale. ▪ Topology ▪ Connection Methods. ▪ The Internet. ▪ IP Address.	6
8	PC Maintenance & Security	▪ Hardware maintenance and Troubleshooting. ▪ Software Maintenance and Troubleshooting.	6

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	25%	--/--/----
	Second Exam	25%	--/--/----
	Med-Term Exam		
	Final Exam	40%	--/--/----
Homework and Projects		10%	
Discussions and lecture presentations			

Teaching Methodology:

- ❖ Lectures

Text Books & References:

Text Book:

- A+ guide to managing and maintaining your pc Thomson 4/E

References:

- George Beekman, Mike Quinn – Tomorrow's Technology and You / Computer Confluence – Pearson/prentice hall – 8/E – 2008

Engineering Program

Specialty	Medical Equipment Technology
Course Number	20411272
Course Title	Computerization Techniques Lab
Credit Hours	1
Theoretical Hours	0
Practical Hours	3

Brief Course Description:

- Practice of the various simple computer software and hardware installation, maintenance, and repair routines as well as use of common application software and performance of basic administrative tasks

Course Objectives:

Upon the completion of the course, the student will be able to:

1. Identify basic computer parts and peripherals. Be able to use mouse, keyboard, menus etc.
2. Be able to manipulate some simple Bios settings as needed.
3. Be able to install and configure Windows and Linux.
4. Perform OS maintenance tasks, manage user accounts, virus protection etc.
5. Spreadsheets, database applications, simple networking.
6. Perform simple hardware maintenance and repair work.
7. Install adequate user security schemes and perform system backup tasks.

Detailed Course Description:

Lab No.	Lab Name	Lab content	Time needed
1	Introduction	Basic computer parts and peripherals; mouse, keyboard, user interface etc.	9
2	Bios	Simple Bios settings and configurations	3
3	Operating Systems	Installation and configuration of Windows XP	12
4	Simple Windows Administrative tasks	OS maintenance tasks, user account management, virus protection etc.	3
5	Hardware Maintenance	Part replacement procedure	3
6	Security and Backup	User privileges, system backup	6

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	25%	--/--/----

	Second Exam	25%	--/--/----
	Med-Term Exam		
	Final Exam	40%	--/--/----
Homework and Projects		10%	
Discussions and lecture presentations			

Teaching Methodology:

- ❖ Practical

Text Book:

- A+ guide to managing and maintaining your pc Thomson 4/E

References:

- George Beekman, Mike Quinn – Tomorrow's Technology and You / Computer Confluence – Pearson/prentice hall – 8/E – 2008

Engineering Program	
Specialty	Medical Equipment Technology
Course Number	20411365
Course Title	Digital Electronics
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Brief Course Description:

- Introducing digital ICs and terminology, Study of TTL logic family, ECL Digital IC family, MOS Digital IC, IC Interfacing, TTL driving MOS, MOS driving TTL, and troubleshooting.

Course Objectives:

Upon the completion of the course, the student will be able to:

1. Understand digital TTL terminology as specified in manufacturer's data sheets.
2. Compare the characteristics of standard TTL and various TTL series.
3. Determine the fan-out for a particular logic device.
4. Use logic devices with open-collector outputs in a wired-AND arrangements.
5. Analyze circuits containing tristate devices.
6. Describe the major characteristics and differences among TTL, ECL, MOS, and CMOS logic families.
7. Cite and implement the various considerations that are required when interfacing digital circuits from different logic families.
8. Use a logic pulser and current tracer as digital circuit troubleshooting tools.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1	Introduction to Digital IC Terminology	1. Current and voltage parameters 2. Fan-out 3. propagation delays 4. Power requirements. 5. Speed-power product. 6. Noise Immunity. 7. AC Noise Margin. 8. Current-sourcing and current-sinking Logic 9. IC Packages.	6
2	The TTL Logic Family	1. Circuit Operation 2. Standard TTL Series Characteristics 3. Other TTL Series. 4. TTL Loading and Fan-Out. 5. Other TTL Characteristics. 6. TTL Open-Collector Outputs. 7. Tristate TTL.	9
3	The ECL Digital IC Family	1. Basic ECL Circuit. 2. ECL OR/NOR Gate 3. ECL Characteristics.	6
4	MOS Digital Integrated Circuits	1. The MOSFET. 2. Digital MOSFET Circuits. 3. Characteristics of MOS Logic. 4. Complementary MOS Logic. 5. CMOS Series Output. 6. CMOS Series Characteristics. 7. CMOS Open-Drain and Tri-state Outputs 8. CMOS Transmission Gate (Bilateral Switch)	6
5	IC Interfacing	1. Definition of an interface circuit. 2. CMOS/TTL Interfacing.	6
6	TTL Driving CMOS	1. TTL Driving 74HCT. 2. TTL Driving High-Voltage CMOS.	3

7	CMOS Driving TTL	1. CMOS Driving TTL in the High State. 2. CMOS Driving TTL in the Low State. 3. High-Voltage CMOS Driving TTL.	3
8	Trouble-shooting	1. Using Logic Pulser to Test a Circuit. 2. Finding Short Nodes. 3. The Current Tracer.	3

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	25%	--/--/----
	Second Exam	25%	--/--/----
	Med-Term Exam		
	Final Exam	40%	--/--/----
Homework and Projects		10%	
Discussions and lecture presentations			

Teaching Methodology:

- Lectures
- Data Show

Text Books & References:

Text Books:

- Digital Fundamentals, Fourth Edition-Thomas Floyd

References:

- Introduction to Switching Theory & Logical Design, Fredrick J. Hill, Gerald R. Peterson, Third Edition

Engineering Program	
Specialty	Medical Equipment Technology
Course Number	20411366
Course Title	Digital Electronics Lab
Credit Hours	1
Theoretical Hours	0
Practical Hours	3

Brief Course Description:

- Introducing digital ICs and terminology, Study of TTL logic family, ECL Digital IC family, MOS Digital IC, IC Interfacing, TTL driving MOS, MOS driving TTL, and troubleshooting.

Course Objectives:

Upon the completion of the course, the student will be able to:

1. Read and understand digital TTL terminology as specified in manufacturer's data sheets.
2. Compare the characteristics of standard TTL and various TTL series.
3. Determine the fan-out for a particular logic device.
4. Use logic devices with open-collector outputs in a wired-AND arrangements.
5. Analyze circuits containing tristate devices.
6. Describe the major characteristics and differences among TTL, ECL, MOS, and CMOS logic families.
7. Cite and implement the various considerations that are required when interfacing digital circuits from different logic families.
8. Use a logic pulser and current tracer as digital circuit troubleshooting tools.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1	The TTL Logic Family	▪ Circuit Operation ▪ Standard TTL Series Characteristics ▪ Other TTL Series. ▪ TTL Loading and Fan-Out. ▪ Other TTL Characteristics. ▪ TTL Open-Collector Outputs. ▪ Tristate TTL.	6
2	The ECL Digital IC Family	▪ Basic ECL Circuit. ▪ ECL OR/NOR Gate ▪ ECL Characteristics.	12
3	MOS Digital Integrated Circuits	▪ The MOSFET. ▪ Digital MOSFET Circuits. ▪ Characteristics of MOS Logic. ▪ Complementary MOS Logic. ▪ CMOS Series Output. ▪ CMOS Series Characteristics. ▪ CMOS Open-Drain and Tri-state Outputs ▪ CMOS Transmission Gate (Bilateral Switch)	6
4	TTL Driving CMOS	▪ TTL Driving 74HCT. ▪ TTL Driving High-Voltage CMOS.	9
5	CMOS Driving TTL	▪ CMOS Driving TTL in the High State. ▪ CMOS Driving TTL in the Low State. ▪ High-Voltage CMOS Driving TTL.	3

6	Trouble-shooting	▪ Using Logic Pulser to Test a Circuit. ▪ Finding Short Nodes. ▪ The Current Tracer.	6

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	25%	--/--/----
	Second Exam	25%	--/--/----
	Med-Term Exam		
	Final Exam	40%	--/--/----
Homework and Projects		10%	
Discussions and lecture presentations			

Teaching Methodology:

- ❖ Workshops-Modules and kits

Text Books & References:

Text Books :

- Digital Fundamentals, Fourth Edition-Thomas Floyd

References:

- Introduction to Switching Theory & Logical Design, Fredrick J. Hill, Gerald R. Peterson, Third Edition Peterson, Third Edition

Engineering Program

Specialization	Medical Equipment Technology
Course Number	20411153
Course Title	Electric Measurement
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Brief Course Description:

- This course provides an introduction to measurement system , Topics covered will include :Measurement system application and units, Instrument type and performance characteristics, Error during the measurement system, Calibration, Measurement Noise and Signal Processing , Type of Sensing Element

Course Objectives:

At the end of this course student will be able to:

1. Study and define measurement system.
2. Explain the Performance characteristic of instrument type.
3. Classify instruments according to the difference between them.
4. Define the type of error that would have an effect on the measurement process.
5. Explain the methods used to reduce the systematic error.
6. To realize the type of noise that effects the measurement system.
7. To explain how the filter can be used to eliminate noise.
8. To define the type of filter.
9. To study the type of sensing element and its use

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1	Introduction to Measurement system	▪ Measurement principle ▪ Unit and unit system * Imperial system * SI system ▪ Measurement system application ▪ Element of measurement system ▪ Choosing Appropriate Measuring Instrument	3
2	Instrument type and Performance Characteristics	▪ Instrument classification ▪ Active and passive instrument ▪ Analog and digital instrument ▪ Null type and deflection type ▪ Smart and non smart instrument ▪ Static characteristic of instrument ▪ Accuracy and inaccuracy ▪ Precision, repeatability ▪ Tolerance ▪ Range of span ▪ Linearity ▪ Sensitivity of measurement ▪ Threshold ▪ Sensitivity disturbance ▪ Dynamic characteristic of instrument ▪ Zero order instrument ▪ First order Instrument ▪ Second order instrument	10
3	Error during the measurement process	▪ Introduction ▪ Systematic error ▪ Random error ▪ Reduction of systematic error ▪ Careful instrument design ▪ Method of opposing input ▪ High gain feedback ▪ Calibration ▪ Statistical analysis of measurement subject to random error ▪ main and median value ▪ Standard deviation and variance	9

4	Calibration	▪ Introduction ▪ Definition of calibration ▪ Control of calibration environment	3
5	Measurement noise	▪ The interference type (source noise) ▪ Source of measurement noise ▪ Inductive coupling ▪ Capacitive (electrostatic) coupling ▪ Noise through multiple earth ▪ Noise in form of voltage transient ▪ Techniques for reducing measurement noise ▪ Location and designing of signal wire ▪ Earthling ▪ Shielding	4
6	Introduction to signal processing	▪ Introduction to signal ▪ Analog signal filtering ▪ Type of filter ▪ low pass filter ▪ high pass filter ▪ band pass filter ▪ band stop filter	3
7	Sensing element	▪ Introduction to passive and active element ▪ Resistive element ▪ Resistive sensing element ▪ Capacitive sensing element	5
8	Introduction to measurement tools	▪ Oscilloscope ▪ Voltmeter ▪ Signal Generators ▪ Digital measurement tools	5

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	25%	--/--/----
	Second Exam	25%	--/--/----
	Med-Term Exam		
	Final Exam	40%	--/--/----
Homework and Projects		10%	
Discussions and lecture presentations			

Teaching Methodology:

- Lectures
- Video Lectures

Text Books & References:

Text Book:

1. Alan S.Morris – Measurement and Instrumentation principles – Plant A Tree – First published - 2001

References:

Engineering Program

Specialization	Medical Equipment Technology
Course Number	20411154
Course Title	Electric measurement lab
Credit Hours	1
Theoretical Hours	0
Practical Hours	3

Brief Course Description:

- Students should acquire practical knowledge of electrical measurement instrument and construct its practically , use the measurement tools , get complete knowledge of galvanometer its parts and construction, repair and calibrate analogue measurement instruments, use the oscilloscope and function generator

Course Objectives:

At the end of this course student will be able to:

1. Use the measurement instruments
2. Use the oscilloscope and function generator
3. Get complete knowledge of galvanometer its parts and construction
4. Repair and calibrate analogue measurement instruments
5. Use the galvanometer to design the basic electrical measurement instruments circuits

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1	Introduction	▪ Electrical and electronic measuring instruments ▪ Errors calculations	3
2	The current meter	▪ the electromagnetic current meter ▪ the thermal current meter	6
3	The moving coil current meter (galvanometer)	▪ its parts and constructions ▪ its principles of operation ▪ AC ammeter ▪ DC Voltmeter ▪ AC Voltmeter ▪ Series ohmmeter ▪ Shunt ohmmeter ▪ Battery checker	9
4	Oscilloscope	▪ Using Oscilloscope in measurements of : voltage , current , frequency	6
5	digital measuring devices	▪ Measurement of current, voltage, resistance and frequency using digital measuring devices, error calculations.	6
6	Filters	▪ Practical operational amplifiers ▪ High pass filters ▪ Low pass filters ▪ Band pass filters ▪ Low pass filters	9
7	Calibration	▪ Basic principles of calibration ▪ Calibration of medical equipment instrument	3

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam		--/--/----
	Second Exam		--/--/----
	Med-Term Exam	30%	
	Final Exam	50%	--/--/----
Homework and Projects		20	
Discussions and lecture presentations			

Teaching Methodology:

- Laboratory

Text Books & References:

Text Book:

1. Hyden electricity one-seven series / harry mileaf.

References:

Engineering Program

Specialization	Medical Equipment Technology
Course Number	20411151
Course Title	Electrical circuit
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Brief Course Description:

- This course provides an introduction to the Voltage, Current, and Resistance, Ohm's Law, Energy and Power, Series-Parallel Circuits, Introduction to Alternating Current and Voltage, Capacitors, Inductors, RLC Circuits and Resonance. Electrical Measurements.

Course Objectives:

Upon the completion of the course, the student will be able to:

1. Define and study current and voltage sources.
2. Use Ohm and kirchoff's laws for analyzing DC electrical circuits.
3. Study the elements of AC circuits.
4. Study the RLC in AC circuits.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Voltage, Current, and Resistance	▪ Atomic Structure ▪ Electrical Charge ▪ Voltage, Current, and Resistance ▪ Voltage and Current Sources ▪ Resistors ▪ The Electric Circuit ▪ DC Circuit Measurements ▪ Electrical Safety	5
2.	Ohm's Law, Energy and Power	▪ The Relationship of Current, Voltage, and Resistance ▪ Calculating Current ▪ Calculating Voltage ▪ Calculating Resistance ▪ Energy and Power ▪ Power in an Electric Circuit ▪ Resistor Power Ratings ▪ Energy Conversion and Voltage Drop in Resistance ▪ Power Supplies	5
3.	Series Circuits	▪ Resistors in Series ▪ Current in a Series Circuit ▪ Total Series Resistance ▪ Application of Ohm's Law ▪ Voltage Sources in Series ▪ Kirchhoff's Voltage Law ▪ Voltage dividers ▪ Power in Series Circuits	3
4.	Parallel Circuits	▪ Resistors in Parallel ▪ Voltage in a Parallel Circuit ▪ Kirchhoff's Current Law ▪ Total Parallel Resistance ▪ Application of Ohm's Law ▪ Current Sources in Parallel ▪ Current Dividers ▪ Power in Parallel Circuits	3
5.	Series-Parallel Circuits	▪ Identifying Series-Parallel Relationships ▪ Calculations of Series-Parallel Resistive Circuits ▪ Voltage Dividers with Resistive Loads	6

		▪ The Wheatstone Bridge ▪ The Superposition Theorem	
6.	Introduction to Alternating Current and Voltage	▪ The Sinusoidal Waveform ▪ Sinusoidal Voltage Sources ▪ Sinusoidal Voltage and Current Values ▪ Angular Measurement of a Sine Wave ▪ The Sine Wave Formula ▪ Introduction to Phasors ▪ Analysis of AC Circuits ▪ Superimposed DC and AC Voltages ▪ Nonsinusoidal Waveforms ▪ The Oscilloscope ▪ Concepts of phasors, complex numbers, rectangular and polar forms of complex numbers, mathematical operations. ▪ Three-phase voltage and current ▪ Y and Δ connections ▪ Line and phase voltages and currents ▪ Power calculations in three-phase circuits ▪ Generation of three phase voltage ▪ Inter connections of three ▪ phase voltage and currents in star connection (Y) and delta connection (Δ) ▪ Mesh method of connection loads with alternator ▪ Active, reactive and apparent power in three phase circuits ▪ Analysis of balanced phase circuits ▪ Balanced and unbalanced three-phase circuits. ▪ AC circuit measurement	10
7.	Capacitors	▪ The Basic Capacitor ▪ Types of Capacitors ▪ Series Capacitors ▪ Parallel Capacitors ▪ Capacitors in DC Circuits ▪ Capacitors in AC Circuits	4
8.	Inductors	▪ The Basic Inductor ▪ Types of Inductors ▪ Series and Parallel Inductors ▪ Inductors in DC Circuits	3

		▪ Inductors in AC Circuits	
9.	RLC Circuits and Resonance	▪ RC Circuits ▪ RL Circuits ▪ RLC Circuits ▪ Resonance circuit	4

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	25%	--/--/----
	Second Exam	25%	--/--/----
	Med-Term Exam		
	Final Exam	40%	--/--/----
Homework and Projects		10%	
Discussions and lecture presentations			

Teaching Methodology:

- Lecture- Board

Text Books & References:

Text Book:

1. "Engineering Circuit Analysis " William H. Hayt, JR. Jack E. Kemmerly

References:

1. Thomas L. Floyd – principles of electric circuits – electron flow version – prentice hall international - eighth edition – 2007 .
2. Robert L. Boylested – introductory circuit analysis – prentice hall international – 1997 .

Engineering Program

Specialization	Medical Equipment Technology
Course Number	20411152
Course Title	Electrical circuit lab
Credit Hours	1
Theoretical Hours	0
Practical Hours	3

Brief Course Description:

- DC circuit analysis, Ac circuit analysis, Resonance. Electrical measurements. The Oscilloscope and its applications in measurements.

Course Objectives:

Upon the completion of the course, the student will be able to:

1. Use the voltmeter, ampere meter and ohm meter.
2. Measure resistors, voltages, and currents in series and parallel DC circuits.
3. Determine currents and voltages by using superposition..
4 .Measure voltages and currents to verify KVL and KCL.
5. Identify shorts and opens in a malfunctioning circuit, and define and verify the equivalent resistance of a given network
6 .Explain the parts and basic operation of oscilloscope
8. Construct different kinds of circuits consisting of RLC
9 .Identify resonance circuit.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Resistor Color Code	▪ Color code, and using the AVO meter to measure different kinds of resistors	3
2.	Measuring Devices	▪ Galvanometer, Ammeter, and Voltmeter	3
3.	Series and parallel DC circuits and Ohm's Law	▪ Measuring equivalent resistor for series and parallel circuits ▪ Measuring voltages and currents in series and parallel circuits ▪ Using voltage divider and current divider rules ▪ Comparison between measured and calculated values by using Ohm's Law ▪	12
4.	Kirchhoff's Laws	▪ Determine voltage and current values using KVL. And KCL.	3
5.	Superposition Theorem	▪ Calculating voltage and current values using Superposition principle	3
6.	The Oscilloscope	▪ Explaining the parts and basic operation of oscilloscope and function generator ▪ Measuring different kinds wave forms	3
7.	Series and parallel AC circuits	▪ Analysis of series RL and RC circuits ▪ Measuring AC voltages and currents ▪ Calculating AC voltages and currents and equivalent impedance ▪ Draw voltage and impedance triangle ▪ Analysis of parallel RL and RC circuits ▪ Measuring AC voltages and currents ▪ Calculating AC voltages and currents and equivalent admittance ▪ Draw voltage and admittance triangle	12
8.	Resonance Circuit	▪ Resonance in RLC circuit ▪ Determine frequency, current, impedance when resonance is occurred ▪ Calculating quality factor of series and parallel resonance ▪ Graphic representation of resonance	6

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam		--/--/----
	Second Exam		--/--/----
	Med-Term Exam	20%	
	Final Exam	50%	--/--/----
Homework and Projects		30%	
Discussions and lecture presentations			

Teaching Methodology:

- Lecture- Board

Text Books & References:

Text Book:

1. "Engineering Circuit Analysis " William H. Hayt, JR. Jack E. Kemmerly

References:

1. Thomas L. Floyd – principles of electric circuits – electron flow version – prentice hall international - eighth edition – 2007 .
2. Robert L. Boylested – introductory circuit analysis – prentice hall international – 1997 .

Engineering Program

Specialization	Medical Equipment Technology
Course Number	20411255
Course Title	Electrical protection system
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Brief Course Description:

- This course provides an introduction to Protection and control system , and you will study : Fuses, Electrical switches, Relays, Circuit breakers, timers, Powers supply and feedback systems.

Course Objectives:

At the end of this course student will be able to:

10. Study and define the type of fuses.
11. Understand electrical switches and their classification.
12. Understand the different types of relays and their function
13. Study circuit breakers and understand their operation.
14. Understand the principle of operation of timers and their types.
15. Define power supplies and understand their operation.
16. Define and study the different types of feedback systems

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1	Fuses	▪ Introduction ▪ Type of fuses ▪ plug fuse ▪ Tamper proof fuse ▪ Dual element plug fuse ▪ Cartridge fuse	4
2	Electrical Switch And contact switch	▪ Manual electric switches ▪ M المرحلاتomentary contact ▪ Maintained contact ▪ Toggle switch ▪ Single pole, single throw SPST ▪ Single pole, double throw SPDT ▪ Double pole, single throw DPST ▪ Double pole, Double throw DPDT ▪ Push button Switches ▪ Rotary switch ▪ Automatic electric switch ▪ Precision snap action switches ▪ Limit switch ▪ Mercury switch ▪ characteristic of mercury switch ▪ Disadvantage	9
3	RELAY	▪ Introduction to relay ▪ Function of relay ▪ Classification of relay ▪ Electromagnetic relay ▪ Relay control method ▪ Direct control ▪ Shunt control ▪ Open and closed system ▪ Locking circuit	**6**
4	Circuit Breaker	▪ Introduction ▪ Respond rate ▪ Thermal breaker ▪ Thermal-magnetic breaker	4

		▪ Operation ▪ Temperature compensation	
5	Timers	▪ Introduction ▪ classification of timers ▪ thermal timers ▪ prosperities ▪ Bimetal timers ▪ Operation ▪ Expansion thermal timer ▪ Motor-driven timers ▪ Advantage ▪ Function ▪ Electronic Timers ▪ Advantage ▪ Operation	6
6	Power Supply	▪ Introduction ▪ Power supply circuit ▪ Transformer ▪ Rectifier stack ▪ Half wave rectifier ▪ Full wave rectifier ▪ Bridge rectifier ▪ Filtration ▪ Filter using inductance ▪ Voltage regulator ▪ Clipper and Clamper circuit	9
7	Feedback system	▪ Introduction ▪ Open loop gain ▪ Closed loop gain ▪ Transfer function ▪ Advantage of negative feedback ▪ Example	4

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	25%	--/--/----
	Second Exam	25%	--/--/----
	Med-Term Exam		
	Final Exam	40%	--/--/----
Homework and Projects		10%	
Discussions and lecture presentations			

Teaching Methodology:

- Lectures
- Video Lectures

Text Books & References:

Text Book:

1. Edwaed F.Driscoll – Industrial Electronic: Device, Circuit and application – American technical puplishers - 1976

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References:

Engineering Program

Specialization	Medical Equipment Technology
Course Number	20411256
Course Title	Electrical protection system Lab
Credit Hours	1
Theoretical Hours	0
Practical Hours	3

Brief Course Description:

- This lab is for student who have just entered or interned to the engineering industry as an apprentice a trainer or technician, lamp socket and safety plug socket , two way switch, Intermediate connection , monitoring lamp, Electromagnetic switch relay ,Contactor Circuit ,Fluorescent lamps, Bell and door opener .

Course Objectives:

At the end of this course student will be able to:

1. Describe and apply the standard electrical drawing .
2. He should know the safety rule which he should apply before and within his work in electrical shop.
3. Know protective and control part which he can use in electrical circuit.
4. Connect and measuring the basic electrical circuit.
5. Use the protective and control system practically.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1	Technical drawing for electrical work	▪ The technical drawing has to be clear and understandable for all parties concerned	3
2	On / Off circuit (switch + plug socket)	▪ Sketch and applying lamp socket and safety plug socket	6
3	Series connecting switch	▪ Explain the structure and function of two way switch ▪ How it connect with load	3
4	Two way circuit	▪ Explain the structure and function of two way switch and how it connect with load	6
5	Intermediate connection	▪ Describe the purpose of an intermediate and explain the structure and function of an intermediate switch How intermediate switch connect with load.	3
6	Illumination lamp	▪ Give reason for the necessity of switch illumination. ▪ Draw and connect series and two way switch with illuminated.	3
7	Monitoring lamps	▪ Explain the application of monitoring lamp draw on connects series and two way switch with monitoring lamp.	3
8	Electromagnetic switch relay	▪ Explain the structure and function of relay ▪ Test and connect the electromagnetic relay with load .	3
9	Contactor Circuit	▪ Reason the application of contactor ▪ Explain the structure and function of contactor ▪ Test and connect contactor with load ▪ Make different between electromagnetic relay and contactor.	3
10	Fluorescent lamps.	▪ To find type of Fluorescent lamp ▪ Explain structure and connect the Fluorescent lamp.	3

11	Bell and door opener & intercom circuit.	▪ Explain and connect bell ▪ Explain and connect door opener ▪ Explain and connect intercom circuit ▪ Give application for each one .	6

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam		--/--/----
	Second Exam		--/--/----
	Med-Term Exam	20%	
	Final Exam	50%	--/--/----
Homework and Projects		30%	
Discussions and lecture presentations			

Teaching Methodology:

- Laboratory

Text Books & References:

Text Book:

1. Uwe Gruner – Technical drawing for electrical engineering 1 – Basic course– GTZ - 1984.

References:

Engineering Program

Specialty	**Medical Equipment Technology**
Course Number	**20411258**
Course Title	**Electro-mechanical systems in medical equipment.**
Credit Hours	**3**
Theoretical Hours	**3**
Practical Hours	**0**

Brief Course Description:
This course provides the basic structure for the, transformers, machines, pumps, compressors, hydraulic system and their application in the medical equipment.

Course Objectives:
Upon the completion of the course, the student will be able to:
1. Discuss the basic structure of magnetic circuit.
2. Define and discuss motors, generators, and transformers.
3. Study and define water treatment, pumps, compressors and hydraulic system.
4. Explain the electro- mechanical systems application in medical equipment field.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed(hr)
1.	**Magnetic circuits**	▪ Magnetic circuits. (I-h relation, B-H relation, magnetic equivalent circuits, magnetization curve, magnetic circuit with gap, inductance). ▪ Hysteresis (hysteresis loss, eddy current loss, core loss). ▪ Sinusoidal excitation (exciting current).	
2.	**Transformers**	▪ Ideal transformer. ▪ Practical transformer.. ▪ Efficiency. ▪ Autotransformer. ▪ Introduction to three-phase transformers.	
3.	**DC Motors**	▪ DC machines (Construction, operation, classification) developed torque, magnetization curve of DC motor. ▪ shunt motors, series motor	
4.	**DC generators**	▪ Separately excited DC generator. ▪ Shunt generator. ▪ Series generator. ▪ Compound generator.	
5.	**Induction machines**	▪ Constructional features. ▪ No-load test, blocked-rotor test, and equivalent circuit parameters. ▪ Performance characteristics... ▪ Stating of induction motors	
6.	**Electro-mechanical application in medical equipment**	▪ Servomotor. ▪ Fans. ▪ Solenoid valves. ▪ Spindles and gears. ▪ Pneumatic switches and valves ▪ Pumps and compressors. ▪ Hydraulic system	

		▪ Filters. ▪ water treatment	

Evaluation Strategies:

Exams	Percentage	Date
Mid term Exam	30%	--/--/----
Final Exam	50%	--/--/----
Homework and Projects	10%	
Discussions and lecture Presentations	10%	

Teaching Methodology:

- ❖ Lecture

Text Books & References:

- ❖ Electric Machinery; Peter F. Ryff; second edition; Prentice Hall International, Inc.
- ❖ Principles of electric machines and power electronics; P.C. SEN; second edition; john wiley & Sons;

Engineering Program

Specialization	Medical Equipment Technology
Course Number	
Course Title	Basics of Electronics
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Brief Course Description:

- This course covers the basic subjects in electronics and you will study: Semiconductor theory , the diode , special purpose diodes , diode applications , bipolar junction transistor (BJT) , field effect transistor (FET) , operational amplifiers, thyristor and other devices.

Course Objectives:

Upon the completion of the course, the student will be able to:

5. Explain the basic structure of atoms.
6. Define and discuss semiconductors, conductors, insulators .
7. Identify the bias and applications of diode, zener ,varactor, and other special diodes.
8. Study of BJT & FET ,oscillators ,operational amplifiers, thyristors and other devices

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Introduction to Semiconductors	▪ Atomic structure ▪ Semiconductors ▪ Conductors ▪ Insulators ▪ Covalent bonds ▪ Conduction in semiconductors ▪ Intrinsic and extrinsic semiconductors ▪ N-type and p- type semiconductors	5
2.	The Diode	▪ P-N junction ▪ Biasing the diode ▪ Voltage – current characteristic of diode ▪ DC load line ▪ Operating point ▪ DC and AC resistance ▪ Comparison between silicon and germanium diodes ▪ Data sheet of diode	6
3.	Special – Purpose Diode	▪ Zener diode (symbol , structure , principle of operation ▪ Zener diode applications (regular and limiter) ▪ Varactor diode. Light- emitting diode (LED), photodiode	5
4.	Applications of The Diode	▪ Half – wave and full – wave rectifiers ▪ Filters and regulators in power supply circuits.	3
5.	Bipolar Junction Transistor (BJT)	▪ Introduction ▪ Structure and principle of operation ▪ Characteristics and parameters. ▪ Regions of operation ▪ The DC operation point)load line) ▪ BJT as an amplifier and as switch ▪ Voltage divider bias and other bias methods ▪ Basic circuits connection ▪ (C.E, C.C, C.B) amplifier ▪ Data sheet of a BJT	6

6.	Field – Effect Transistor(FET)	▪ Introduction. ▪ Structure and principle of operation of junction field effect transistor (JFET). ▪ JFET characteristics, Parameters and biasing. ▪ Structure and principle of operation of metal oxide semiconductor field effect transistor (MOSFET). ▪ Enhancement and depletion types. ▪ MOSFET characteristics, Parameters and biasing. ▪ FET amplification, connections modes (C.S, C.D, C.G,) amplifiers, data sheet of a JFET and a MOSFET.	5
7.	Oscillators	▪ Introduction ▪ Negative and positive feedback, (basic circuit, principle of operation, oscillation frequency calculation for the following oscillators. Phase – shift oscillator ▪ Colpitts and Hartley oscillators	3
8.	Operational Amplifiers	▪ Symbol, terminals and basic op-amp representations (idea and practical)	3
9.	Thyristor and Other Devices	▪ Structure ,principle of operation ▪ Characteristics curves and applications of the following devices: (Four – layer device, SCR (Silicon – controlled rectifier), siac, triac, Uninjunction transistor (UJT), and phototransistor	3
10.	Introduction to Electronic Measurements	▪ Applications of oscilloscope in electronic measurements	3

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	25%	--/--/----
	Second Exam	25%	--/--/----
	Med-Term Exam		
	Final Exam	40%	--/--/----
Homework and Projects		10%	
Discussions and lecture presentations			

Teaching Methodology:

- Lecture- Board

Text Books & References:

Text Book:

1. Thomas L. Floyd, electrical devices, prentice hall international, 6th edition , 2002.

References:

3. Basic operational Amplifiers and Linear Integrated Circuits , David Buchla ,Prentice Hall , 1999.
4. Electronics fundamental and Experiments, Cynthia B. Leshin, David Buchla, Tjomas L. Floyd, prentice hall international ,1999.

Engineering Program

Specialization	Medical Equipment Technology
Course Number	
Course Title	Basics of Electronics Lab.
Credit Hours	1
Theoretical Hours	0
Practical Hours	3

Brief Course Description:

- Lab in support of the basic electronics course, experiments in basic electronics have to cover all electronics devices (diode, zener diode, diode applications, BJT,op – amp ,oscillators ,SCR).

Course Objectives:

Upon the completion of the course, the student will be able to:

6. Become familiar with electronics devices and using data sheet.
7. Demonstrate how to test electronic devices by using AVO meter or through DC measurements.
8. Construct electronic circuit.
9. Investigate characteristics curves.
10. Calculate the value the values of currents and voltage and compare them with measured values

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	The diode	▪ Forward and reverse biasing. ▪ Characteristic curve. ▪ Data sheet.	3
2.	The zener Diode.	▪ Breakdown voltage. ▪ Regulation. ▪ Characteristic curve. ▪ Data sheet	3
3.	Rectification Circuits with Filter and Regulator	▪ Half- wave and full- wave. ▪ Ripple factor. ▪ Line and load regulation	3
4.	A BJT testing by using AVO meter , and how to determine the specifications of transistor through data sheets		3
5.	A BJT with Voltage – Divider Bias		3
6.	A BJT as a switch		3
7.	Common Emitter Amplifier Circuit		3
8.	Common collector Amplifier circuit		3
9.	Common Base Amplifier Circuits		3
10.	Common source Amplifier Circuits		3
11.	Operational Amplifier as Inverting and Noninverting Amplifier		3

12.	Operational Amplifier as Differentiator and Integrator		3
13.	RC phase-shift Oscillator		3
14.	SCR as a switch		**3**

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam		--/--/----
	Second Exam		--/--/----
	Med-Term Exam	20%	
	Final Exam	50%	--/--/----
Homework and Projects		30%	
Discussions and lecture presentations			

Teaching Methodology:

- Laboratory

Text Books & References:

Text Book:

3. Instructional Lab. Sheets
4. Thomas L. Floyd – " Principles of electric circuits" Electron flow version - prentice hall International – eighth edition 2006

References:

3. Robert L. Boy listed - Introductory circuit analysis - prentice hall International 1997.
4. Experiments in electronics Fundamentals and electric circuits fundamentals – David Buchla -. prentice hall 2000.

Engineering Program

Specialization	Medical Equipment Technology
Course Number	20411373
Course Title	Engineering Software MATLAB
Credit Hours	1
Theoretical Hours	0
Practical Hours	3

Brief Course Description:

MATLAB is an interactive system for doing numerical Computations. MATLAB makes use of highly respected algorithms and hence you can be confident about your results.

Powerful operations can be performed using just one or two commands. You can also build your own set of functions. Excellent graphics facilities are included.

Course Objectives:

Introduce the students to the software MATLAB, and familiarize them with the basic commands in order to run simulation , evaluate numerical computations, and even to build different system in simulink , such as solving differential equations

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1	Introduction	▪ What is matlab programming. ▪ Who to start using matlab programming.	3
2	Using MATLAB as a calculator	▪ Basicarithmetic operators. ▪ Number and formate ▪ Variable Names ▪ Built-In Functions	3
3	Beginning to Use MATLAB	▪ Vectors ▪ Plotting Elementary Functions ▪ Script Files ▪ Products, Division and Powers of Vectors	6
4	Matrices	▪ Creating Matrices ▪ Dot product of matrices . ▪ Matrix - vector products ▪ Matrix-Matrix Products. ▪ Systems of Linear Equations. ▪ Characters, Strings and Text . ▪ Loops. ▪ Logicals ▪ While Loops. ▪ Function m-files	18
5	Further Built-in Functions	▪ Rounding Number ▪ The sum Function ▪ max & min	6
6	Random Numbers	▪ find for vectors ▪ find for matrices	6

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	20%	--/--/----
	Second Exam	20%	--/--/----
	Med-Term Exam		
	Final Exam	50%	--/--/----
Homework and Projects		10%	
Discussions and lecture presentations			

Teaching Methodology:

- Lecture, computer lab

Text Books & References:

Text Book:

manual matlab

Engineering Program

Specialization	Medical Equipment Technology
Course Number	20411202
Course Title	First Aids
Credit Hours	3
Theoretical Hours	2
Practical Hours	3

Brief Course Description:

- course is designed to introduce the student into emergency medical care providing him with the knowledge and skills that make him able to do patient assessment and choose first Aid priorities and the more suitable instruments which allow him to manage Airway Obstruction, shock and bleeding, soft-Tissue injuries (wounds), soft tissue Injuries (Burns) trauma and fractures, medical emergency (Allergies Reaction) and medical emergency (Poisoning) and, environmental emergency, and altered mental status, It also introduces him to the skills needed for doing CPR

Course Objectives:

At the end of this course student will be able to:

1. The general rules, ethics and basis of First Aid.
2. How to examine and assess the causality safely and effectively.
3. How to deal with common first Aid Emergency.
4. How to assess many varying emergency situations to determine what patient care is needed and to provide the necessary care.
5. How / CPR is done safely.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1	Introduction	▪ Introduction to emergency medical ▪ care. ▪ Definition of first aid. ▪ Equipment and supplies. ▪ Medical, legal and ethical.	3
2	Patient assessment	▪ Primary survey. ▪ Secondary survey for patient (trauma). ▪ Baseline vital signs	3
3	The air way	▪ Oxygen sources. ▪ Equipment for oxygen delivery. ▪ Masks. ▪ Airway accessories. ▪ Suction.	3
4	Shock and bleeding	▪ Definition. ▪ Assessing shock. ▪ Causes, classification. ▪ Emergency care for shock. ▪ Types of bleeding. ▪ Emergency care for bleeding. ▪ Bleeding from (ears, nose, and mouth)and emergency care.	3
5	Soft – Tissue Injuries (wounds)	▪ Definition. ▪ Closed injuries. ▪ Open injuries. ▪ Emergency for soft-tissue ▪ injuries(dressing and bandages).	3
6	Soft tissue injuries (burns)	▪ Definition. Classification, and Causes ▪ Severity of Burns. ▪ Emergency medical Care for.	3
7	Trauma And Fractures	▪ Fractures and Dislocation, Causes and ▪ Diagnosis. ▪ Emergency Care for patients with ▪ Fractures. ▪ Splinting, Principles of splinting, ▪ Equipments. ▪ Spinal cord injury Assessment Signs ▪ and Symptoms, Emergency Medical ▪ Care of the Spine – Injured Patient	3

8	Medical Emergency (poisoning	▪ Assessment of allergies Reactions. ▪ Cause, signs and symptoms. ▪ Emergency medial care for patients ▪ with Allergies Reaction	3
9	Medical Emergency (poisoning)	▪ History of poisoning. ▪ Types and signs and symptoms. ▪ Use of activated charcoal	3
10	Environmental Emergency	▪ Heat stroke, Heat Exhaustion, Heat ▪ cramps (Definition, Diagnosis, and ▪ Management). ▪ Hypothermia (Signs and Symptoms, ▪ Emergency care) ▪ Drowning.	3
11	Altered Mental Status	▪ Diabetic Emergency. ▪ Seizures. ▪ Emergency care of patients with ▪ Altered Mental status	3
12	Airway Obstruction	▪ Choking – Heimlich Manoeuvre ▪ (Adults, Children) ▪ Choking.	3
13	CPR	▪ CPR (Adults, Children) ▪ CPR (Infants)	3
14	First Aid priorities	▪ Case classification & triage	3

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam		--/--/----
	Second Exam		--/--/----
	Med-Term Exam	30%	
	Final Exam	50%	--/--/----
Homework and Projects		20%	
Discussions and lecture presentations			

Teaching Methodology:

- Lectures
- Video Lectures

Text Books & References:

Text Book:

1. First Aid. Taking Action MCGRAWII, NSC, 2007.
2. First Aid. CPR And AED, JONES AND BARTLETT, Thygcrson, 2005.
3. First Aid. CPR, And AED Essentials. 41, AMERICAN COLLEGE OF. EMERG. Phy, 2005.
4. Airway Management Paramedic, Jones And Bartlett, Margolis, 2004
5. First Aid Manual, DK PUB, 2002

References:

1. د .قطاش، رشيدي حمدان وقطاش، أحمد حمدان وحسن، نوال، الاسعافات الاولية – الطبعة الأولى مؤسسة الوراق للتوزيع والنشر، 2004 م
2. د .الصفدي، عصام، الإسعافات الأولية، الأردن – الطبعة الأولى، دار اليازوري العلمية للنشر، 2001 م.
3. د .فريحات، حكمت عبد الكريم والحمود، محمد طه ود .أبو الرب، صلاح، أسس الإسعاف الأولي

Engineering Program	
Specialty	Medical Equipment Technology
Course Number	20411381
Course Title	Fundamentals of Medical Equipment
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Brief Course Description:
The student should acquire a good knowledge in the properties of changes that take place in the human body as well as the transducers, electrical safety, and management of the medical equipment maintenance workshop.

Course Objectives:
Upon the completion of the course, the student will be able to:

1. Recognize and understand the bioelectric signals.
2. Discuss the various types of transducers.
3. Discuss the various types of electrodes.
4. Understand the concept and necessity of electrical safety.
5. Manage medical equipment workshop.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Introduction to Bioelectric signals	▪ Introduction to the origin of bioelectric signal in the human body. ▪ Introduction to the man-instrument system ▪ Listing the major systems that make up the body ▪ Studying briefly the major bioelectric potentials, ECG, EEG, EMG, and other potentials.	8
2.	Transducers	▪ Introduction to medical instrumentation and physiological variables ▪ Describing the transducer and transduction principles ▪ Listing and describing the two major types of transducers; active and passive transducers. ▪ Studying the basic physical variables and transducers for biomedical applications.	8
3.	Electrodes	▪ Introduction ▪ Clarifying the differences between electrodes and transducers ▪ Studying the electrode theory ▪ Listing and describing the types of electrodes; biopotential electrodes and biochemical electrodes (transducers)	9

4.	Electrical Safety	▪ Introduction ▪ Introducing to the risks due to the electric current and electric shock on the human body. ▪ Listing types and consequences of electric shock to the patient and user (operator) of medical equipment. ▪ Studying and classifying the degree of protection against electric shock. ▪ Listing the types of leakage current ▪ Properties of insulated and earth connected transformers as well as those connected to special transformer protection tools. ▪ Electric safety, connection requirements and anti electric shock measurement means in patients rooms, operating rooms, intensive care units and cardiac care units.	10
5.	Management of Medical Equipment Maintenance Workshop	▪ Introduction ▪ Major elements of the management system. ▪ Main tasks of biomedical department. ▪ Equipment and service data. ▪ Types of service contracts. ▪ Planned Preventive maintenance. ▪ Cost-benefit of in-house maintenance ▪ Medical Equipment classification	7

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	25%	--/--/----
	Second Exam	25%	--/--/----
	Med-Term Exam		
	Final Exam	40%	--/--/----
Homework and Projects		10%	
Discussions and lecture presentations			

Teaching Methodology:

- Lecture- Board, Data Show

Text Books & References:

1. Introduction to Biomedical Equipment Technology, Carr, Joseph J.
2. Encyclopedia of Medical Devices and Instrumentation, Webster, John G.
3. Biomedical Instrumentation and Measurements, Cromwell, Leslie.
4. Hospital Electrical Safety, Robert B. Spooner.
5. Biomedical Instruments Theory and Design, Welkowitz, Deutsch Akay.

Engineering Program

Specialization	Medical Equipment Technology
Course Number	20411101
Course Title	Human Physiology
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Brief Course Description:

- This course provides an introduction to the human body, and you will study : The cell, The nervous system, The heart, blood circulation, The respiratory system, The urinary system, the skin, The Muscular System, The Digestive System , Skeletal System.

Course Objectives:

At the end of this course student will be able to:

17. Major constituent of the human body organs.
18. Function of the organs.
19. Concept of work of the parts of the organs, the way they are related in order to complete their functions.
20. Variables that can be measured to point out the function of organs. Ways of measuring these variables.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1	The cell	▪ Introduction ▪ Parts of the cell. ▪ Ionic distribution inside and outside the cell. ▪ Cell membrane and the difference in effort between the states of rest. ▪ Electrical alertness in the muscular and nervous system cell. ▪ Movement of electric activity in nerve cells. ▪ Effect of electric activity on muscular cells.	3
2	The nervous system	▪ Introduction. ▪ Parts of the nervous system. ▪ Perception and sense receptors. ▪ Reception and sensitivity system. ▪ Main parts of the brain. ▪ Electric activity of the brain.	6
3	Blood circulation	▪ Introduction. ▪ Blood component. ▪ Veins and arteries. ▪ Blood volume and distribution in the body organs. ▪ Blood circulation and blood pressure.	3
4	The heart	▪ Introduction. ▪ Parts of the heart. ▪ Blood movement in the heart. ▪ Heart functions mechanism. ▪ Blood pressure distribution and changes in the heart. ▪ Noises of the heart. ▪ Electric activity of the heart.	6
5	The respiratory system	▪ Introduction. ▪ Parts of the respiratory system. ▪ Respiration mechanism. ▪ Gas exchange in the lungs.	3

		▪ Lunges sizes. ▪ Partial pressure of gases in the lunges.	
6	The kidney	▪ Introduction. ▪ Parts of the kidney. ▪ Kidneys function in cleaning, purifying and filtering the blood, as well as in organizing the liquids of the body.	3
7	The skin	▪ Introduction ▪ Parts of the skin. ▪ Skin functions. ▪ Body temperature regulation in the skin. ▪ Perception systems in the skin. ▪ Secreting gland in the skin.	3
8	The Muscular System	• Introduction in muscle and muscles tissues: Muscles types, Functions. ▪ Major Skeletal Muscles of the body.	6
9	The Digestive System	• Digestive system Organs: Relationship & structural Plan. • The Stomach. • The Small intestine and associated structures. • The large intestine. • Absorption.	6
10	Skeletal System	• Bones basic structure. • Skeletal cartilages: Basic structure, types, locations. • Major skeletal bones of the body. • Functions of bones and joints.	3

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	25%	--/--/----
	Second Exam	25%	--/--/----
	Med-Term Exam		
	Final Exam	40%	--/--/----
Homework and Projects		10%	
Discussions and lecture presentations			

Teaching Methodology:

- Lectures
- Video Lectures

Text Books & References:

Text Book:

1. Principles of Anatomy and Physiology 12th edition , by GERARD J.TORTORA & BRYAN H.DERRICKSON

.

References:

1. References: Human Anatomy & Physiology. Elaine N.Marieb,R.N.,Ph.D. Holyoke Community Collage. Katja Hoehn, M.D., ph.D. Mount Royal College. 7th Edition. Benjamin Cummings. 2007.
2. Fundamentals of physiology A human persective., Lauralee Sherwood. Department of physiology, School of medicine, West Virginia University. Second Edition. West publishing company.1992

Engineering Program	
Specialty	Medical Equipment Technology
Course Number	20411263
Course Title	Logic Design
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Brief Course Description:

- Study of number systems, logic gates, Boolean algebra, De Morgan's theorems, Karnaugh map, flip-flops, counters and shift registers.

Course Objectives:

Upon the completion of the course, the student will be able to:

5. Discuss the various number systems; binary, octal, hexadecimal, and BCD.
6. Convert between these systems.
7. Design and minimize logic circuits using Boolean algebra, De Morgan's theorems, and Karnaugh map.
4. Understand encoders, decoders, multiplexers, and demultiplexer.
5. Discuss flip-flops and vibrators.
6. Discuss counters and shift registers.

Detailed Course Description :

Unit Number	Unit Name	Unit Content	Time Needed
1	Introduction to Digital Concepts	1. History of Digital Electronics 2. Digital and Analogue Quantities 3. Logic Levels and Pulse 4. Elements of Digital Logic. 5. Functions of Digital Logic. 6. A system Application. 7. Digital Integrated Circuits. 8. Digital Testing and 9. Troubleshooting Instruments.	3
2	Number Systems and Codes	8. Decimal Numbers 9. Binary Numbers 10. Decimal-to-Binary Conversion. 11. Binary Arithmetic. 12. Octal Numbers. 13. Hexadecimal Numbers. 14. Binary Coded Decimal (BCD). 15. Digital Codes.	9
3	Logic Gates	1. The Inverter. 2. The AND Gate. 3. The OR Gate. 4. The NAND Gate. 5. The NOR Gate. 6. The Exclusive-OR and Exclusive-7. NOR Gates. 8.Boolian algebra 9. demorgan theory & k-map	6

4	Logic Functions	1. Half and Full Adders. 2. Decoders. 3. Encoders. 4. Multiplexers (Data Selector). 5. Demultiplexers.	6
5	Flip-Flops and related Devices	1. Latches. 2. Edge-triggered Flip-Flops. 3. Pulse-Triggered (Master-Slave) Flip-Flops. 4. Data Lock-Out Flip-Flops. 5. Basic Flip-Flop Applications. 6. One-Shots. 7. Astable Multivibrators and Timers.	6
6	Counters	3. Asynchronous Counters. 4. Synchronous Counters. 5. Up/Down Synchronous Counters. 6. Design of Sequential Circuits. 7. Cascaded Counters 8. Counter Decoding. 9. Counter Applications.	6
7	Shift Registers	1. Shift Register Functions. 2. Serial In-Serial Out Shift Registers. 3. Parallel In-Parallel Out Shift Registers. 4. Bidirectional Shift Registers. 5. Shift Register Counters. 6. Shift Register Applications.	6

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	25%	--/--/----
	Second Exam	25%	--/--/----
	Med-Term Exam		
	Final Exam	40%	--/--/----
Homework and Projects		10%	
Discussions and lecture presentations			

Teaching Methodology:

- Lectures
- Data Show

Text Books & References:

Text Books

- Digital Fundamentals, Fourth Edition-Thomas Floyd

References:

- Introduction to Switching Theory & Logical Design, Fredrick J. Hill, Gerald R. Peterson, Third Edition

Engineering Program	
Specialty	Medical Equipment Technology
Course Number	20411264
Course Title	Logic Design Lab
Credit Hours	1
Theoretical Hours	0
Practical Hours	3

Brief Course Description:

- This course will cover in support of the digital (I) course practically the logic circuits and its applications.

Course Objectives:

Upon the completion of the course, the student will be able to:

1. explain and construct the basic logic circuits.
2. construct the basic triggering circuits .
3. use the logic circuits to construct some digital storage elements .
4. explain the switching algebra equations .

Detailed Course Description:

Lab number	Lab Name	Lab content	Time needed
1	Introduction to digital electronics	• Illustrate the difference between analog and digital electronics.	3
2	Basic logic circuits	• AND gate. • OR gate. • NOT gate. • NAND gate. • NOR gate. • EX-OR gate. • EX-NOR gate.	3
3	Switching algebra	• Boolean algebra. • Karnogh-veitch diagram.	3
4	Triggering circuits	• Astable trigger circuit • Monostable trigger circuit. • Bistable trigger circuit. • Schmitt trigger circuit	9
5	digital storage element	• RS flip flop. • D flip flop.	6
6	Digital storage elements	• master-slave flip flop. • Edie triggered JK flip flop.	6
7	Counters and registers	• Asynchronous binary counters. • Asynchronous counting-down binary counters. • Asynchronous counting with reversing the counting direction. • Synchronous counting up binary counter • Ring counter • Register.	12

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	20%	--/--/----
	Second Exam	20%	--/--/----
	Med-Term Exam		
	Final Exam	50%	--/--/----
Homework and Projects		10%	
Discussions and lecture presentations			

Teaching Methodology:

- Practical

Text Books & References:

Text Books

- basic digital circuits (Siemens training system).

References:

- Introduction to Switching Theory & Logical Design, Fredrick J. Hill, Gerald R. Peterson, Third Edition

Engineering Program

Specialty	Medical Equipment Technology
Course Number	**20411389**
Course Title	Maintenance Management
Credit Hours	**3**
Theoretical Hours	**3**
Practical Hours	**0**

Brief Course Description:

The student should acquire a good knowledge about equipment maintenance management. This includes definition and objectives of maintenance, types of maintenance activities, maintenance department organization. Statistical analysis is also covered, which includes reliability and failure rates. Preventive maintenance (PM) and total productive maintenance (TPM) are described in details as well.

Course Objectives:

Upon the completion of the course, the student will be able to:

8. Recognize and understand the principles and objectives of maintenance.
9. Develop a basic understanding of the role of maintenance in profitability and productivity.
10. Understand/define reliability and how to improve system reliability.
11. Define Preventive Maintenance and its significance.
12. Define Total Productive Maintenance and steps to implement it successfully.
13. Calculate Overall Equipment Effectiveness.
14. Distinguish projects from repetitive tasks.
15. Understand the key elements in successful project management.
16. Understand the Computerized Maintenance Management System and its basic functions.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
6.	Introduction to Maintenance Management	▪ Maintenance Objectives. ▪ Structure of the Maintenance Function. ▪ Total Productive Maintenance (TPM). ▪ Types of Maintenance Activities. ▪ Maintenance Department Organization.	6
7.	Statistical Applications	▪ System Reliability. ▪ Failure Rate. ▪ Mean Time Between Failures, Availability, and Mean Downtime. ▪ Improving System Reliability. ▪ Equipment Life-Cycle Failure Rate. ▪ 6. Graphical and Mathematical Analysis.	9
8.	Preventive Maintenance	▪ Types of Preventive Maintenance. ▪ Equipment History. ▪ Establishing a System of Criticality. ▪ Planning for Preventive Maintenance. ▪ 5. Cost of Preventive Maintenance.	6
9.	Implementing Total Productive Maintenance	▪ Total Productive Maintenance (TPM). ▪ A Change in the Corporate Culture. ▪ Unions and TPM. ▪ Overall Equipment Effectiveness (OEE). ▪ 5. TPM Activities and Processes.	9
10.	Facility Maintenance Projects Planning and Control	▪ Facility Maintenance Projects. ▪ The Role of Project Manager ▪ Maintenance Operations Analysis. ▪ Project Management tools and Techniques. ▪ 5. Computer Program Solutions.	6
11.	Computerized-Maintenance Management Systems (CMMS)	▪ Introducing CMMS. ▪ Basic Functions: - Labor Tracking - Vendor and Manufacturer Information - Inventory Management - Equipment Records - Scheduling - Work Orders - Purchase Orders - Security - Reports	**6**

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	25%	--/--/----
	Second Exam	25%	--/--/----
	Med-Term Exam		
	Final Exam	40%	--/--/----
Homework and Projects		10%	
Discussions and lecture presentations			

Teaching Methodology:

- Lecture- Board, Data Show

Text Books & References:

Engineering Program

Specialization	Medical Equipment Maintenance
Course Number	20411388
Course Title	Medical Imaging
Credit Hours	3
Theoretical Hours	2
Practical Hours	3

Brief Course Description:

Study X-Ray Equipment, ultrasonic scanning, and MRI: Principles, Functions, gamma ray, CT scan, and fluoroscopy.

Course Objectives:

Upon the completion of the course, the student will be able to:

1- Understand the importance of Image equipment in the medical sector.
2- Study the X-ray Theory.
3- Study the MRI Theory.
4- Explain the MRI device.
5- Study the ultrasound theory.
6- Explain the Ultrasound Scanner.
7- Explain the function of CT Scanning machine.
8- Explain the Function of Gamma ray machine.

Detailed Course Description:

Unit. No.	Content	**Notes**	Time Needed/hour
1.	Physics of Radiography	• Atomic Structure. • Electron Bending Energy. • Ionization & Excitation. • Electromagnetic Radiation. • Primary Energetic Electron Interactions. • Primary Electromagnetic Radiation Interactions. • Production of X-Rays. • Bloch Diagram and operation. • The Interaction of X-ray and Gamma- ray With Matter. • Compton Process (Modified Scatter). • Photoelectric Absorption. • Properties of X-ray & Gamma ray. • Absorbed Dose. • Filtration.	6
2.	Fluoroscopy	1. Fluoroscopy: • Image Intensifier: Gain, Dual & Triple mode, Beam splitter, Vignetting. • Block Diagram & Operation. • The television system: Camera Tube, Monitor Tube, Video Tape Recording. • Cameras: Cineradiography, Photospot film camera.	6

		• Image Quality: Resolution, Contrast, Dynamic range of the television monitor, Noise, Typical Doses & dose rates, Quantum sink. 2. Digital Imaging: • Equipment: Digitizer, Computer, Image display, Digital photospot. • Image processing, storage, and recording: Windowing, Background subtraction, Noise reduction, Edge enhancement, Data shifting, Image Storage, Cameras. • Imaging Subtraction Angiography: Noise, Temporal subtraction, energy subtraction, hybrid subtraction. • Quality Assurance. • Clinical Applications of x-ray imaging: Mammography, Abdominal x-ray scans, 3. Computed Tomography (CT): • Principles of computed tomography imaging: CT Numbers, scanning the patient, acquiring the data, reconstructing the image, Windowing. • CT Instrumentation: CT Generations, X-ray source and collimation, CT Detectors, Gantry, slip ring, and patient table.	

		• CT scanner: Configurations, Detectors. • Image Quality: Noise, Spatial resolution of high/ Low contrast objects, Contrast resolution, trade off, Dose, Artifacts. • Other Techniques: Zoom reconstruction, Scanning in other planes, Spiral (Helical) Scanning, Two & three dimensional reformatting, Cine CT Scanning. • Picture Archiving & communication system (PACS). Clinical Applications of computed tomography: Cerebral Scans, Pulmonary disease, Abdominal imaging	
3.	Gamma Imaging	• Radioactivity: Stable nuclei, Isotopes, Radio nuclides. • Radioactive Transformation (Decay): Nuclides with a neutron deficit, K-electron capture, Gamma rays, Bata rays, positron emitters, Radioactive decay. • Gamma Imaging: The multihole collimator, The crystal, photomultipliers, pulse arithmetic, pulse height spectrum, pulse height analyzer, the monitor, he computer, dynamic imaging, types of gamma camera, collimators. • Characteristics and quality assurance of the gamma image: Uniformity of field, spatial resolution, linearity,	6

		energy resolution, temporal resolution, sensitivity, noise. • Block Diagram & Operation. • Radiopharmaceutical: Desirable properties, technetium generator, preparation. • Dose to the patient: dose to an organ, effective dose to the body, typical activities and dose. • Precautions to be taken in the handling of the radionuclides: Segregation, personal protection, patient protection. • SPECT Imaging.	
4.	Ultrasonic Imaging	• General Principles. • Wave Propagation & Characteristic acoustic impedance. • Wave reflection & refraction. • Energy loss mechanisms in tissue: Absorption, Scattering, Attenuation. • Instrumentation: Single Crystal Transducers, Transducer Arrays, ultrasound probes, mechanical scanner, electronic scanner, Beam forming & time-gain compensation. • Diagnostic Scanning Modes: A-Mode, M-Mode, and B-Mode Scans, Three dimensional Imaging.	4

		• Artifacts in Ultrasonic Imaging. • Image Characteristics: Signal-to-noise ratio, spatial resolution, Contrast-to-noise ratio. • Compound Imaging. • Blood velocity measurements using ultrasound: The Doppler Effect, Continuous wave Doppler measurement, Pulsed-mode Doppler measurements, color Doppler/B-Mode duplex imaging, Time-domain correlation/ Color Velocity Imaging. • Ultrasound Contrast agents, Harmonic imaging, and pulse inversion techniques. • Safety & Bioeffects in ultrasonic imaging. • Clinical Applications of ultrasound: Obstetrics & Gynecology, Breast imaging, musculoskeletal structure, Cardiac disease.	
5.		• The spinning Proton. • The magnetic resonance signal. • Atomic Magnetism. • Instrumentation: Magnet design, Magnetic field gradient coils, & Coils, radiofrequency coils, super conducting magnets. • Imaging Sequences: Spin ECHO-sequence, T1 & T2	5

	Magnetic Resonance Imaging	weighted imaging sequences, Multislice imaging, rapid gradient echo sequences & three-dimensional imaging, echo planner imaging, spiral imaging. • Spatial encoding. • Characteristics of the magnetic resonance image. • Magnetic resonance angiography: Time of flight methods, phase contrast methods. • Diffusion-weighted imaging. • IN VIVO localized spectroscopy. • Functional MRI. • Clinical Applications of MRI: Brain, Liver & the Reticuloendothelial system, Musculoskeleal System, Cardiac System • Artifacts. • Quality assurance. • Hazards.	

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	20%	--/--/----
	Second Exam	20%	--/--/----
	Med-Term Exam		

	Final Exam	50%	--/--/----
Homework and Projects		10%	
Discussions and lecture presentations			

Teaching Methodology:

- Lecture- Board

Text Books & References:

Text Book:

1. Biomedical Instrumentation Technology & Applications. R.S. Khandpur, Graw Hill, New York, 2005.

References:

1. Medical Imaging Signals and Systems. Jerry L. Prince, Jonathan, M. Links. Pearson prentice Hall, Johns Hopkins University, New Jersey, 2006.
2. Physics for Medical Imaging. RF Farr and PJ Allisy-Roberts, Saunders, Great Britain. 2004.
2. Radiation Exposure and Image Quality in X-ray Diagnostic Radiology/ Physical
3. Principles and Clinical Applications. Horst Aichinger, Joachim Dierker, Sigrid Joite-Barfuß, Manfrid Säbel. Springer - Verlag Berlin Heidelberg / New York. 2004.
3. Introduction to Biomedical Equipment Technology. Joseph J. Carr, John M. Brown.Prentice Hall / 4th edition. New Jersy 2001.
5. Medical Devices & Systems. Joseph D. Bronzino. Taylor & Francis. USA, 3rd edition, 2006.
6. Introduction to Biomedical Imaging. Andrew Webb. University of Illinois Urbana IL, Wiley- interscience, New Jersey, 2003

Engineering Program

Specialization	**Medical Equipment Technology**
Course Number	20411257
Course Title	**Technical Diagram**
Credit Hours	2
Theoretical Hours	1
Practical Hours	2

Brief Course Description:
This course aims at giving students of fine machinery the ability to read and use control systems process diagrams; and giving them the ability to detect possible defects and clearly determine their nature then to carry out necessary reparation.

Course Objectives:

1. Reading electrical circuits elements and symbols
2. Reading electronic circuit and common defect
3. Reading logic gates symbols and memory circuits
4. Reading electrical measurement tools, special symbols
5. Home installation symbols
6. Protective circuits symbols
7. motor and generator symbols
8. Operation control units tag number
9. The presentation of signal lines used in operational control
10. Reading different control process diagram
11. Reading control process variables sensors symbols

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed (hours)
1.	**Reading electrical circuits elements and symbols**	▪ Linear and non linear resistance ,constant and variable sources, pneumatic and electrolyte capacitors, inductors, diodes, zeiner diodes ,tunnel diode, photo diode. ▪ Bi-polar transistor, MOSFET, JFET, Thyristor, Triac, Diac. ▪ Air and iron core transformer, auto-transformer. ▪ Operational amplifiers.	
2.	**Reading electronic circuit and common defect**	▪ Diode circuits ▪ Transistor circuits, JFET circuits, MOSFET circuits. ▪ Triode circuit, rectification circuits, filters circuits ▪ Amplifiers circuits, Op.Amp circuits	
3.	**Reading logic gates symbols and memory circuits**	▪ NOT gate ,OR gate, AND gate ,NAND gate . ▪ Exclusive OR circuits ▪ T,J,K,D,S-R flip-flops ▪ Understanding how to replace those parts from catalogs	
4.	**Reading electrical measurement tools, special symbols**	▪ Special symbols related to the type of source , insulation test symbols, correct measurements position symbols, precision stage special symbols ▪ Special symbols related to type and principles of operation of the instruments ▪ Reading the information plate of the unit. ▪ Examining connection of the different electrical measurements tools such as :ammeter ,voltmeter.	

		wattmeter, different types of electric circuits counters with both constant and variable(Tri-phase or one-phase)star, delta connection	
5.	**Home installation symbols**	▪ Studying the symbols element (switches, starters,fuses,panels circuits breakers. ▪ Symbols as lamp circuits, florescent ,lamp, bell .	
6.	**motor and generator symbols**	▪ Reading the different connection of AC and DC motors and generators ▪ Understanding the rotation direction, controlling the motor speed ,operating switches. ▪ Delta – star connections, connecting the motor plat to delta star connection.	
7.	**Protective circuits symbols**	▪ Fuses , Relays , contractor, circuit breaker, toggle switches, push bottom switches, protective and control circuits in electrical motors	
8.	**Operation control units tag number**	▪ Classification of relays used in control system according to there functions ▪ Recognizing control element . meaning of the different letters according to their tag numbers	
9.	**The presentation of signal lines used in operational control**	▪ Reading signal symbols used in operational control ▪ Reading symbols regulators that are used to control pressure ,flow , temperature, level	
10.	**Reading control process variables sensors symbols**	▪ Special symbols devices ,pressure control ,level,	

		flow(flux), temperature, density, humidity and weight	
11	**Reading different control process diagram**	▪ Reading of system diagram control with level, pressure and temperature ▪ Reading pneumatic systems, and understanding valves operations, actuators used with vector valves, cylinders symbols, filters	
12	**Software application**	▪ Circuit maker	

Evaluation Strategies:

Exams		Percentage	Date
Theoretical Exam	Mid Exam	20%	--/--/----
	Final Exam	20%	--/--/----
Practical Exam	Mid exam	20%	--/--/----
Homework and Projects	Homework and Projects	20%	
	Final exam	20%	

Teaching Methodology:

- ❖ Lectures and help sessions

Text Books & References:

References

1. Raymond A. Serway and John W. Jewett**,** **"**Physics for scientists and Engineers", 7th edition, Thomson Brooks Publisher, 2007.
2. David Halliday, Robert Resnick, and Jearl Walker, "Fundamentals of Physics Extended", 8th edition, John Wiley & Sons, 2008.

Engineering Program

Specialty	Medical Equipment Technology
Course Number	20411231
Course Title	Technical English
Credit Hours	3
Theoretical Hours	2
Practical Hours	3

Brief Course Description:

This course divided into six main units that discuss practical English.

- ❖ It develops student's level in general skills and also makes them in advanced to express their ideas and thoughts and deal with daily English life.

Course Objectives:

1. Ideas development for student , so they can express their thoughts
2. Enhance student's skills, reading, writing, and translation as possible.
3. Make students able to do different exercises in conversations and dialogues
4. Student will be able to write and translate different subjects for example science , management , engineering and public

Detailed Course Description:

Unit Number	Unit Name	**Unit Content**	Time Needed (hours)
7.	grammar and vocabulary	▪ Tenses ▪ Modals ▪ Relative clauses and conditional clauses ▪ Passive voice ▪ Reported speech ▪ Dictionary work ▪ Collocations ▪ Words meaning ▪ Telling times and dates ▪ Phonetics	
8.	Writing	▪ Introduction to writing ▪ Types of writing ▪ Paragraph development ▪ Writing paragraphs ▪ Writing letters ▪ Writing reports ▪ Application writing	
9.	Listening	▪ Listening words ▪ listening conversations ▪ Exercises ▪ Audio listening	
10.	Translation	▪ The principles of translation ▪ Examples on paragraphs. ▪ Paragraphs translation ▪ Science translation ▪ Public translation	
11.	Technical terms	▪ Electronic terms ▪ Mechanic terms ▪ General technical terms	

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	20%	--/--/----
	Second Exam	20%	--/--/----
	Med-Term Exam		
	Final Exam	40%	--/--/----
Homework and Projects		10%	
Discussions and lecture presentations		10%	

Teaching Methodology:

- Using CD audio
- Using board
- Using LAB PCS/ data show

Text Books & References:
Text Books

References:

1. Effective reading by Simon greenall and Michael swan / Cambridge University
2. paragraph development by martin arnaudet and Mary Ellen Barrett
3. English grammar in use by Raymond Murphy
4. translation 1 by ALQuds open university

Engineering Program	
Specialty	Medical Equipment Technology
Course Number	20411382
Course Title	Therapeutic equipment (1) (Theoretical) Medical Equipment (2)
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Brief Course Description:
Students should acquire a practical knowledge of the technical aspects of some of the medical equipment , such as Suction Units , Operation Tables and Lights, Dental Units , Infant Incubators ,Defibrillator , Hemodialysis Machines , and Lithotripters.

Course Objectives:
Upon the completion of the course, the student will be able to:

28. Introduction into uses and ways of Measurements equipment.
29. Professional work concept.
30. Parts and circuits of the major electric circuits.
31. Electric safety.
32. Preventive maintenance and calibration.
33. Possible defects.
34. Define and repair the defects using the proper examining equipment.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1	**Suction Units**	▪ Describe the operating principles of several types of pumps. ▪ Implement preventive maintenance procedures. ▪ Recognize simple fault situations and take appropriate action.	**4**
2	**Operation Tables and Lights**	▪ Describe the operating principles of several types of tables and lights. ▪ Understand the design behind various models. ▪ Recognize simple fault situations and take appropriate action.	**4**
3	**Dental Units**	▪ State the purpose of dental units. ▪ List the major components of dental units. ▪ List and describe the necessary installations required for dental units. ▪ List and describe all types of hand pieces used for patient treatment. ▪ Describe the mechanisms of operation of dental chairs. ▪ Be aware of how to perform trouble-shooting and maintenance on dental units.	**8**
4	**Infant Incubators**	▪ State the need of using infant incubator for premature infants. ▪ List and describe the main parameters to be controlled by an infant incubator ▪ List and describe the ways of heat loss. ▪ Describe the components of an infant incubator. ▪ List and describe all types of infant incubators. ▪ Perform troubleshooting and	**8**

		maintenance on infant incubators.	
5	**Defibrillator**	▪ Understand physiology of the human heart. ▪ Implement safety rules for use and handling of these equipment. ▪ Understand design principles and signal processing. ▪ Recognize simple fault situations and take appropriate action.	**5**
6	**Hemodialysis Machines**	▪ State the functions and importance of kidneys. ▪ List and describe the causes of renal failure. ▪ Distinguish peritoneal dialysis from hemodialysis. ▪ List and describe all types of circuits in a hemodialysis machine. ▪ List and describe the types of dialyzers used in hemodialysis machines. ▪ List and describe the methods of water treatment and concentrate on the reverse osmosis system utilized in hemodialysis departments. ▪ Perform troubleshooting and maintenance on hemodialysis machines.	**9**
7	**Lithotripters**	▪ Describe the principle of operation, its components, block diagram, and its application.	**4**

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	20%	--/--/----
	Second Exam	20%	--/--/----
	Med-Term Exam		
	Final Exam	40%	--/--/----
Homework and Projects		10%	
Discussions and lecture presentations		10%	

Teaching Methodology:

- Lecture- Board, Data Show

Text Books & References:

5. Introduction to Biomedical Equipment Technology, Joseph J. Carr and John M. Bro,N-n, John Wiley, 1981.
6. Introduction to Biomedical Electronics, Joseph DuBo-,y, Mc Grain-Hill, 1987.
7. Bioelectronic Measurements, Dean Al DeMarre & David Michaels, Prentice Hall, 1983.
8. Servicinc Medical and Bioelectronic Equipment, Josephine J. Carr, Tab Books Inc.
9. Biophysical Measurements, Peter Strong, TeKtronix Inc., 1970.
10. Biomedical Instrumentation and Measurements, Dean A. DeMarre and David Michaels, Prentice Hall, 1980

Engineering Program	
Specialty	Medical Equipment Technology
Course Number	20411383
Course Title	Therapeutic equipment (1) (Practical)
Credit Hours	1
Theoretical Hours	0
Practical Hours	3

Brief Course Description:
Students should acquire a practical knowledge of the technical aspects of some of the medical equipment such as Suction Units , Operation Tables and Lights, Dental Units , Infant Incubators ,Defibrillator , Hemodialysis Machines , and Lithotripters.

Course Objectives:

Training the student practically on the equipment mentioned in the curricula concerning the following aspects.

I. Warnings and recommendations of manufacturing company.
2. Contents and operation.
3. Electric safety.
4. Electric circuits and charts.
5. Preventive maintenance and calibration.
6. Possible defects / induced defects.
7. Define and repair the defects using the proper examining equipment.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1	Suction Units		6
2	Operation Tables and Lights		6
3	Dental Units		6
	Infant Incubators		6
5	Defibrillator		6
6	Hemodialysis Machines		9
7	Lithotripters		3

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam		--/--/----
	Second Exam		--/--/----
	Med-Term Exam	20%	
	Final Exam	50%	--/--/----
Homework and Projects		30%	
Discussions and lecture presentations			

Teaching Methodology:

- Lecture- Board, Data Show

Text Books & References:

1. Introduction to Biomedical Equipment Technology, Joseph J. Carr and John M. Bro',N-n, John Wiley, 1981.
2. Introduction to Biomedical Electronics, Joseph DuBo-',y, Mc Grain-Hill, 1987.
3. Bioelectronic Measurements, Dean Al DeMarre & David Michaels, Prentice Hall, 1983.
4. Servicinc' Medical and Bioelectronic Equipment, Josephine J. Carr, Tab Books Inc.
5. Biophysical Measurements, Peter Strong, TeKtronix Inc., 1970.
6. Biomedical Instrumentation and Measurements, Dean A. DeMarre and David Michaels, Prentice Hall, 1980

Engineering Program

Specialty	Medical Equipment Technology
Course Number	20411384
Course Title	Therapeutic equipment (2) (Theoretical)
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Brief Course Description:

- Students should acquire a practical knowledge of the technical aspects of some of the medical equipment: electrosurgical unit, Anesthesia, Ventilators, Endoscopes, ophthalmic instruments, medical Laser.

Course Objectives:

Training the student practically on the equipment mentioned in the curricula concerning the following aspects.

1. Introduction into uses and ways of Measurement equipment.
2. Professional work concept.
3. Parts and circuits of the major electric circuits.
4. Electric safety.
5. Preventive maintenance and calibration.
6. Possible defects.
7. Define and repair the defects using the proper examining equipment.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1	**Electro-surgical Unit**	▪ Describe the principles behind the electrosurgry machine. ▪ Draw the principal electrosurgry machine waveforms and the circuits used to generate them. ▪ Describe the correct procedure for the safe handling of electrosurgry machines. ▪ State how to troubleshoot, maintain, and calibrate electrosurgry machines.	**5**
2	**Anesthesia**	▪ Identify, handle, and safely connect medical gas cylinders. ▪ Make up and test medical gas hoses to the re requirements. ▪ Carry out routine servicing procedures and performance tests on therapy flow meters, regulators, and cylinders. ▪ Perform safety and pre-use checks on anesthesia trolleys. ▪ Recognize potential hazard solutions, and make corrective maintenance.	**8**
3	**Ventilators**	▪ Describe the physiological basis (diseased states) for requiring artificial respiratory therapy. ▪ Describe medical gases and safety systems (cylinders, high-pressure control). ▪ Describe the procedure and equipment used in oxygen therapy (regulators, flow meters, humidifiers/nebulizers, cannulas, oxygen masks, and oxygen tents). ▪ Describe the procedure and equipment used in intermittent positive pressure	**9**

		(IPPB) therapy. ▪ Describe the procedure and equipment used in artificial mechanical ventilation ▪ Know how to describe accessory devices used in respiratory therapy apparatus (respiratory monitors/alarms, oxygen analyzer). ▪ Know how to describe sterilization and isolation used in respiratory therapy units. ▪ List typical faults and maintenance procedures for artificial respiratory ventilators.	
4	**Endoscopes**	▪ List different types of endoscopes and their applications. ▪ Describe the principle of operation and main parts of endoscopes. ▪ List maintenance procedure and typical faults for endoscopes.	**6**
5	**Ophthalmic Instruments**	▪ Understand the physiology of human eyes. ▪ State the purpose, uses, principle of operation, and maintenance of the following ophthalmic instruments: - Ophthalmoscope - Slit Lamp - Biometers - Refractometers - Tonometers	**8**
6	**Medical laser (LASER)**	▪ List the different types of laser ▪ Describe the principle of operation. ▪ List main medical application for laser	**6**

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	20%	--/--/----
	Second Exam	20%	--/--/----
	Med-Term Exam		
	Final Exam	40%	--/--/----
Homework and Projects		10%	
Discussions and lecture presentations		10%	

Teaching Methodology:

- Lecture- Board, Data Show

Text Books & References:

1. Introduction to Biomedical Equipment Technology, Joseph J. Carr and John M. Bro',N-n, John Wiley, 1981.
2. Introduction to Biomedical Electronics, Joseph DuBo-',y, Mc Grain-Hill, 1987.
3. Bioelectronic Measurements, Dean Al DeMarre & David Michaels, Prentice Hall, 1983.
4. Servicinc' Medical and Bioelectronic Equipment, Josephine J. Carr, Tab Books Inc.
5. Biophysical Measurements, Peter Strong, TeKtronix Inc., 1970.
6. Biomedical Instrumentation and Measurements, Dean A. DeMarre and David Michaels, Prentice Hall, 1980

Engineering Program	
Specialty	Medical Equipment Technology
Course Number	20411385
Course Title	Therapeutic equipment (2) (practical)
Credit Hours	1
Theoretical Hours	0
Practical Hours	3

Brief Course Description:

- Students should acquire a practical knowledge of the technical aspects of some of the medical equipment: electrosurgical unit, Anesthesia, Ventilators, Endoscopes, ophthalmic instruments, medical Laser.

Course Objectives:

Training the student practically on the equipment mentioned in the curricula concerning the following aspects.

1. Warnings and recommendations of manufacturing company.

Contents and operation.

8. Electric safety.

9. Electric circuits and charts.

10. Preventive maintenance and calibration.

11. Possible defects / induced defects.

7. Define and repair the defects using the proper examining equipment.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1	Electro-surgical Unit		**6**
2	Anesthesia		**6**
3	Ventilators		**9**
4	Endoscopes		**6**
5	Ophthalmic Instruments		**9**
6	Medical laser (LASER)		**6**

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	20%	--/--/----
	Second Exam	20%	--/--/----
	Med-Term Exam		
	Final Exam	40%	--/--/----
Homework and Projects		10%	
Discussions and lecture presentations		10%	

Teaching Methodology:

- Lecture- Board, Data Show

Text Books & References:

7. Introduction to Biomedical Equipment Technology, Joseph J. Carr and John M. Bro,N-n, John Wiley, 1981.
8. Introduction to Biomedical Electronics, Joseph DuBo-',y, Mc Grain-Hill, 1987.
9. Bioelectronic Measurements, Dean Al DeMarre & David Michaels, Prentice Hall, 1983.
10. Servicinc, Medical and Bioelectronic Equipment, Josephine J. Carr, Tab Books Inc.
11. Biophysical Measurements, Peter Strong, TeKtronix Inc., 1970.
12. Biomedical Instrumentation and Measurements, Dean A. DeMarre and David Michaels, Prentice Hall, 1980