Engineering Program	
Specialization	Medical Equipment Technology
Course Number	020406101
Course Title	Mechanical Skills 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), types 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.	6

		▪ milling machine options and accessories.	
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.