University of Management and Technology

Course Outline

Course code: ET 232 Course title: Materials and Hardware I

Program	BSc Aircraft Maintenance Engineering Technology
Credit Hours	02+01
Duration	15 weeks
Prerequisites	Nil
Resource Person	Fatima Najeeb Khan
Counseling Timing (Room#)	Tuesday 14:00 to 17:00 Thursday 14:00 to 17:00 Friday 14:00 to 17:00
Contact	fatima.najeeb@umt.edu.pk

Chairman/Director signature…….

Dean's signature…… **Date…….**

Learning Objective:

This course equips students with the knowledge of the materials and hardware used in the construction, maintenance and repair of aircraft. The content on aircraft materials covers the characteristics, properties and identification of ferrous, non-ferrous metals and alloys such as aluminum, steel and titanium as well as non-metallic composites. It also covers corrosion recognition, prevention and control. The composite manufacturing/layup and repair will be discussed in detail. Fabric and wooden constructions will be dealt with along with repairing.

Upon successful completion of the course, the student should be able to:

S No	**CLO Statement**	**PLO**	**Learning Domain and level**
1.	Demonstrate understanding of general properties of metals and metal alloys commonly used in aircraft construction.	**1**	**C1**
2.	Familiarization with material testing techniques	**5**	**C2**
3.	Identify the various types of corrosion, causes and its preventative control	**4**	**C3**
4.	Conduct and Interpret the results of experiments and demonstrations of Aircraft Material Properties.	**3**	**P3**
5.	Effectively communicate experiment results through both written reports and oral Presentations.	**10**	**P3**

1. CLO – PLO MAPPING:

CLOs	PLOs											
	Engineering Technology Knowledge	Problem Analysis	Design / Development of Solutions	Investigation	Modern Tool Usage	The Engineering Technologist and Society	Environment and Sustainability	Ethics	Individual and Team Work	Communication	Project Management	Lifelong Learning
	1	2	3	4	5	6	7	8	9	10	11	12
1	**C1**											
2					**C2**							
3				**C3**								
4			**P3**									
5										**P3**		

Learning Methodology:

- The teaching of the course will be via a series of lectures. This will be complemented by the use of textbook, and an extensive range of web resources plus handouts/articles and video clips.

- Participants should expect 5-6 class activities during the semester which will form the basis for evaluation (viva). 2 assignments, individual/group presentations and quizzes. These activities will be complemented with discussions and analysis to strengthen the learning.

Recommended Text Books:

1 .“Materials and Hardware” by AERO-Bildung Germany [2014]

Reference Books:

1. “Materials and Hardware”-Aviation Maintenance Technician Certification Series by Aircraft Technical Book Company

Grade Evaluation Criteria

Following is the criteria for the distribution of marks to evaluate final grade in a semester.

Marks Evaluation **Marks in percentage**

Theory:

Marks Evaluation	Marks in percentage
Quizzes (x6)	15%
Assignments (x2)	10%
Evaluation(Viva)	5%
Presentation	5%
Mid Term Examination	25%
End Term Examination	40%
Total	100 %

Practical:

Marks Evaluation	Marks Percentage
Class activity	5%
Team work	5%
Quizzes	15%
Viva	5%
Lab Report	10%
Final Evaluation	60%
Total	100%

Calendar of Course contents to be covered during semester

Course code: ET 232 **Course title: Materials and Hardware I**

Week	Course Contents	Reference Chapter(s)	Quiz	Assignments	CLOs
1	Introduction to materials and material characteristics	6.1	1	1	1
2	Aircraft Materials-Ferrous Characteristics, properties, identification of common alloy steels used in aircraft.	6.2			
3-4	Aircraft materials- Non Ferrous Characteristics, properties and identification of common non-ferrous materials used in aircraft. Aluminum, Magnesium, Titanium, Copper, Monel Metal, Lead and alloys.	6.2	2	1	1,2
5-6	Aircraft Materials- Composite and Non-Metallic Characteristics, Properties and Identifications Sealants and Bonding Agents	6.3		1	1
7	Aircraft Materials- Composite and Non-Metallic The Detection of Defects/ Deterioration Repair of Composite and Non-Metallic Material	6.3		1	1

8	Mid Term Examination				
9-10	Wooden Structures Construction methods, Characteristics, Properties and types of wood and glue used	6.3	3	2	1,2
11	Preservation and Maintenance of Wooden Structure, types of defects, detection of defects in wooden structure and repair of wooden structure	6.3			
12-13	Corrosion Chemical fundamentals, types and material types susceptibility to corrosion	6.4	4	2	1,4
14-15	Fasteners Screws Thread forms, dimensions and tolerances for standard threads	6.5.1			

Materials and Hardware I Lab Outline

Lab	Description	CLOs
1	Prepare metallurgical specimen for microscopic examination	
2	Study of microstructure of mild steel specimen using metallurgical microscope (EF 122L Material Engg)	**3**
3	Comparison of microstructure of low, medium, and high carbon steel (EF 122L)	
4	Annealing of steel (Heat Treatment Process) and study microstructure changes occurred in it	
5	Normalizing of steel (Heat treatment process) and study microstructure changes in it	
6	Quenching of steel (Heat treatment process) and study the microstructure changes occurred in it.	
7	Perform strain hardening process and examine structural deformation in specimen	
8	Check specimen hardness using Rockwell Hardness Method	
9	Tensile test on Hot Rolled steel bar ASTM 615/615M (Mechanics of solid lab)	
10	Tensile test on Cold-worked steel reinforcement bar/Tor bar ASTM 615/615M (Mechanics of solid lab)	
11	Impact test on steel and brass samples in bending using Charpy's Impact Test (Mechanics of solid lab)	
12	Compression test wooden cubes when load is applied	

Class Policy

STUDENTS ARE REQUIRED TO READ AND UNDERSTAND ALL ITEMS OUTLINED IN THE PARTICIPANT HANDBOOK

CLASS ATTENDANCE: Students need to be in class at the assigned time. After 10 minutes past the assigned time, the students will be marked absent.

TURN OFF MOBILE PHONE! It is unprofessional to be texting or otherwise.

READ EMAILS! Participants should regularly check their university emails accounts regularly and respond accordingly. Students would be responsible if they miss a deadline because of not reading the emails.

CLASS ATTENDANCE POLICY: A minimum of 80% attendance is required for a participant to be eligible to sit in the final examination. Being sick and going to weddings is absence and will not be counted as present. Participants with less than 80% of attendance in a course will not be allowed to take end term exams. International students who will be leaving for visa during semester should not use any days off except for visa trip to avoid reaching short attendance.

MOODLE: UMT –LMS (Moodle) is an Open Source Course Management System (CMS), also known as a learning Management System (LMS). Participants should regularly visit the course website on MOODLE Course Management system, and fully benefit from its capabilities. In case of any problem while using MOODLE, visit http://oit.umt.edu.pk/moodle. For queries email moodle@umt.edu.pk

HARASSMENT POLICY: Sexual or any other harassment is prohibited and is constituted as punishable offence. Sexual or any other harassment of any participant will not be tolerated. All actions categorized as sexual or any other harassment when done physically or verbally would also be considered as sexual harassment when done using electronic media such as computers, mobiles, internet, emails etc.

USE OF UNFAIR MEANS/ HONESTY POLICY: Any participant found using unfair means or assisting another participant during a class test/quiz, assignments or examination would be liable to disciplinary action.

PLAGIARISM POLICY: All students are required to attach a "Turnitin" report on every assignment, big or small. Any student who attempts to bypass "TurnItin" will receive "F" grade which will count towards the CGPA. The participants submit the plagiarism report to the resource person with every assignment, report, project, thesis etc. If student attempts to cheat Turnitin, a second "F" will be awarded that will count towards the CGPA. There are special rules on plagiarism for final reports etc. all outlined in your handbook.

COURSE WITHDRAWAL POLICY: Students may withdraw from a course till the end of the 12th week of the semester. Consequently, grade 'W' will be awarded to the student which shall have no impact on the

calculation of the GPA of the student. A Student withdrawing after the 12th week shall be automatically awarded “F” grade which shall count in the GPA.

COMMUNICATION OF RESULTS: The results of quizzes and assignments are communicated to the participants during the semester and answer books are returned. It is the responsibility of the course instructor to keep the participants informed about his/her progress during the semester. The course instructor will inform a participant at least one week before the final examination related to his or her performance in the course.

Faculty Signature ……. **Date…….**