Course Syllabus — Materials Engineering Technology Laboratory Syllabus (AES-2062)

Credit Hours: 1 Credit hour

Co-requisites: Materials Engineering Technology (AES-2061)

QFE Level: 5

Knowledge: Comprehensive, specialized knowledge within a broad field of work or discipline, including an understanding of the underlying theoretical and abstract concepts with significant depth in some areas. A broad understanding of allied knowledge and theories in related fields of work or disciplines including related regulations, standards, codes, conventions and procedures. An understanding of information assembly, retrieval methods and logical problem-solving techniques from a range of sources. Recognition of sources of current knowledge and the integration of concepts from related fields. Literacy to comprehend and/or produce coherent texts covering complex relations from an array of information and contexts. Numeracy covering an array of mathematical procedures and representations and contexts.

Skills: Technical, creative and conceptual skills appropriate to solving a wide-range of problems associated with a field of work or discipline that include a comprehensive range of specialist cognitive and practical skills appropriate to diagnosing and implementing solutions to abstract, familiar and nonroutine problems within a field of work or discipline. Use of appropriate information retrieval methods and tools and techniques associated with the field of work or discipline. Comprehensive communication and information technology skills to present, explain and/or critique complex matters. Literacy skills to comprehend and/or produce, from array of information, coherent texts covering complex relations. Numeracy skills to select, apply, reflect and communicate an array of mathematical procedures and representations and contexts

Competence:

Autonomy and responsibility: Can take responsibility for coordinating the implementation of appropriate approaches to complex work procedures and processes, resources or learning, including leading teams within a technical or paraprofessional activity. Can exercise coordination and/or supervision in routine, familiar and some nonroutine work or learning contexts. Can coordinate technical, design processes in routine, familiar, nonroutine and an array of contexts with support available, if required. Can express an internalized, personal world view, in the context of an understanding of socio-cultural relationships.

Role in context: Can function with autonomy in technical and coordination contexts and support paraprofessional roles under guidance can function both independently and in a coordination role with multiple groups. Can take responsibility for coordinating the development of individuals and groups. Can review and develop the performance of self and others.

Self-development: Can evaluate own learning and identify learning needs in a familiar environment. Can take responsibility for and plan own learning within a managed and nonroutine environment. Can comprehend and observe ethical standards.

Course Description

This Lab is an experimental course intended to complement Materials Engineering Technology (AES-2061) course. The purpose of the course is to explore some of the main materials science concepts experimentally. Students will conduct and analyze experiments on stress strain behavior by tensile and compression tests, behavior of materials under torsion test, measurement of specimen

toughness by impact test, hardness measurement, creep rate measurement, and describe their results in laboratory reports while working either individually or in teams.

Instructors: TBD, TBD@adpoly.ac.ae

Schedule and Duration: The laboratory will start in second first week and meet biweekly. The experiments are conducted in groups. The duration is 10 teaching weeks at 2 hours/week. (1 Credit Hour)

Course Objectives

The overall objective of the course is to develop student ability to identify materials mechanical properties and analyze materials behavior under standard tests.

Textbook

1. ACAD Basic Curriculum, Materials Science, General Physics Corporation, Elkridge, Maryland, 2003.
2. Materials Sciences Laboratory Manual, AD Poly 2017

Attendance

Sessions start on the hour. Students arriving after the session starts will be counted absent. Students will receive warnings and potential penalties from the Student Services Office or their sponsor if they reach 5%, 10%, and 15% absence. After 15% absence, students will receive a FA (fail due to absence) grade.

Academic Honesty Policy

Students must conduct their studies at AD Poly honestly, ethically, and in accordance with accepted standards of academic conduct. Any form of academic conduct which is contrary to these standards is academic misconduct, for which AD Poly may penalize the student.

Specifically, it is academic misconduct for a student to:

- Present copied, falsified, or improperly obtained data as if it were the result of laboratory work, field trips, or other investigatory work;
- Include in the student's individual work material which is the result of significant assistance from another person if that assistance was unacceptable according to the instructions or guidelines for that work;
- Cheat or attempt to cheat; or
- Plagiarize (knowingly presenting the work or property of another person as if it were one's own)

Abu Dhabi Polytechnic considers cheating or attempting to cheat a serious offense that will result in disciplinary action taken against involved individuals. Students caught cheating or attempting to cheat will earn an “F” grade in the course.

Course Learning Outcomes (CLOs)

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

CLO1: Apply best practice in lab safety, including three-way communication

CLO2: Write lab reports that adhere to high quality standards and meet submission deadlines
CLO3: Measure material properties by conducting experiments
CLO4: Plot and analyze experimental stress-strain curve and determine yield point.
CLO5: Determine specimen hardness by Rockwell tester.
CLO6: Measure specimen toughness by conducting impact test

Course Topics

CT1: Stress strain relationship and behavior of materials under tensile test.

CT2: Hardness. Hardness measurement by Rockwell tester.

CT3: Toughness measurement by impact test.

CT4: Stress-strain relationship and behavior of materials under compression test. Poisson's ratio.

ABET Student Outcomes

The Higher Diploma in Nuclear Technology program student outcomes (SO) are taken from the 2019 ABET (Accreditation Board for Engineering and Technology) standard. Student Outcome 2 is from the associate degree standard and Student Outcomes 1, 3, 4, and 5 from the bachelor's degree standard.

SO1. An ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems appropriate to the discipline;

SO2. An ability to design solutions for well-defined technical problems and assist with the engineering design of systems, components, or processes appropriate to the discipline;

SO3. An ability to apply written, oral, and graphical communication in broadly defined technical and non-technical environments; and an ability to identify and use appropriate technical literature;

SO4. An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes; and

SO5. An ability to function effectively as a member as well as a leader on technical teams.

Table 1: Relation Course Topics (CTs) to Course Learning Outcomes (CLOs)

	CT1	CT2	CT3	CT4
CLO1	H	H	H	H
CLO2	H	H	H	H
CLO3	H	H	H	H
CLO4	H	H		
CLO5			H	
CLO6				H

H: High, M: Moderate, L: Low

Table 2: Relation Course Learning Outcomes (CLOs) to Students Outcomes (SOs*)

	SO1	SO2	SO3	SO4	SO5

CLO1					H
CLO2	L		H		M
CLO3	H				
CLO4	H		H	H	M
CLO5	H		H	H	M
CLO6	H		H	H	M

H: High, M: Moderate, L: Low
* SOs correspond to the ABET Student Outcomes (see above).

Assessments: Laboratory reports and laboratory parrticipation

Grading policy

Laboratory participation	10%
Laboratory reports	90%
Total	100%

Week-by-Week Teaching Plan

Week	Experiment	Experimental Topic	Textbook Reference
2		Lab introduction	
4	Experiment 1	Study of stress strain behavior of a material by tensile test	[2] Lab manual, [1] Chapter 2
6	Experiment 2	Hardness measurement by Rockwell tester	[2] Lab manual, [1] Chapter 2
8	Experiment 3	Toughness measurement by impact test	[2] Lab manual [1] Chapter 2
10	Experiment 4	Study of stress strain behavior of a material by compression test	[2] Lab manual [1] Chapter 2