

Course Name						
INTRODUCTION TO NON DESTRUCTIVE TESTING OF MATERIALS						
Code	Semester	Local Credits	ECTS Credits	Course Implementation, Hours/Week		
				Theoretical	Tutorial	Laboratory
MET 483E	7	2	3	2	-	-
Department/Program	Metallurgical and Materials Engineering Department					
Course Type	Elective		Course Language		English	
Course Prerequisites	None					
Course Category by Content, %	Basic Sciences	Engineering Science	Engineering Design	General Education		
	-	40	60	-		
Course Description	Non-Destructive testing methods have a significant importance in production and service operations as far as the quality assurance of products are concern. This course will provide a wide range of information on nondestructive testing methods and their applications. The Scope of NDT, The Need and the Definition of NDT, Comparison of Destructive and Non Destructive Testing Techniques, NDT methods, Liquid Penetrant Testing, Magnetic Particle Testing Ultrasonic testing, Radiographic Testing, Eddy Current Testing, Other NDT tests and their applications					
Course Objectives	<p>The student who completes this course will have the knowledge on:</p> <ol style="list-style-type: none"> 1. Basic concepts in Non-Destructive Testing (NDT). 2. NDT Applications in different engineering fields 3. Liquid Penetrant, Magnetic Particle, Eddy Current, Ultrasonic and Radiography Tests Principles. 4. Applications and limitations of Liquid Penetrant, Magnetic Particle, Eddy Current, Ultrasonic and Radiography Tests 5. Flaw Determination by using NDT 6. Developments in flaw determination in Casting, Rolling, Pipe production, welding using NDT 7. Data Evaluation in NDT 8. the relations of Failure Analysis and Materials Properties and integrate these knowledges with NDT applications. 9. Standards on NDT 10. Liquid Penetrant, Magnetic Particle, Eddy Current, Ultrasonic and Radiography Tests Hardwares 					
Course Learning Outcomes	<p>This course will give our student:</p> <ol style="list-style-type: none"> 1. the confidence and knowledge on the relationships between quality assurance and non-destructive testing 2. liquid penetrant test techniques and their applications 3. magnetic particle test techniques and their applications 4. ultrasonic test techniques and their applications 5. radiography tests techniques and their applications 6. Eddy Current tests techniques and their applications 7. Added to this, they will be able to evaluate NDT results in light of standards and their materials knowledge 					
Textbook	Handout on Nondestructive Testing					
Other References	<ol style="list-style-type: none"> 1. Paul E. Mix, P.E., E.E., Introduction to Nondestructive Testing: A Training Guide, 2nd Edition ISBN: 978-0-471-42029-3, July 2005 Wiley 2. Ravi Prakash Nondestructive Testing Techniques. New Academic Science Ltd May 2009 ISBN 13: 9781906574062 ISBN 10: 1906574065 					
Homework & Projects						
Laboratory Work	-					
Computer Use	-					
Other Activities	-					
Assessment Criteria	Activities	Quantity		Effects on Grading, %		
	Midterm Exams	1		20		
	Quizzes					
	Homework	2		20		
	Projects	1		20		
	Term Paper/Project					
	Laboratory Work					
	Other Activities					
	Final Exam	1		40		

COURSE PLAN

Weeks	Topics	Course Outcomes
1	The definition of nondestructive testing, destructive and non destructive tests and their comparison	1-6
2	Principles of Liquid penetrant test, applications and limitations	2-6
3	Application procedure of liquid penetrant test, introduction of liquid penetrant test hardwares	2-6
4	Magnetic particle test principles, applications and limitations	3-6
5	Magnetization methods, application procedure of magnetic particle test, introduction magnetic particle test hardwares	3-6
6		
7	Radyography test principles, applications and limitations	5,6
8	Application procedure of radyography test, introduction of radyography test hardwares	5,6
9	Ultrasonic test principles, applications and limitations	4-6
10	Application procedure of ultrasonic test, introduction of ultrasonic test hardwares	4-6
11	Eddy Current test principles, applications and limitations	7
12	Other NDT tests and their applications	1-6
13	Student projects` presentations, discussions and evaluations	1-6
14	Student projects` presentations, discussions and evaluations	1-6

Relationship between the Course and Metallurgical and Materials Engineering Curriculum

	Student Outcomes	Level of Contribution		
		1	2	3
1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering science and mathematics	X		
2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare as well as global, cultural, social, environmental and economic factors			X
3	an ability to communicate effectively with a range of audiences			X
4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts			
5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives			X
6	an ability to develop and conduct appropriate experimentation, analyse and interpret data, and use engineering judgement to draw conclusions		X	
7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies	X		

1: Little, 2: Partial, 3: Full

Course relationships with major elements of the field and material classes

		Level of Contribution		
		1	2	3
MAJOR ELEMENT OF THE FIELDS	STRUCTURE		X	
	PROPERTIES		X	
	DESIGN EXPERIMENT/ANALYSE DATA			X
	PROCESSING			X
	COST/PERFORMANCE			X
	QUALITY/ENVIRONMENT			X
	DESIGN PROCESS OR PRODUCT			X
MATERIAL CLASSES	METAL			X
	CERAMICS AND GLASS		X	
	POLYMER			
	COMPOSITES			
	BIOMATERIALS			

1: Little, 2: Partial, 3: Full

<u>Prepared by</u>	<u>Date</u> December 2020	<u>Revision #</u>	<u>Signature</u>
--------------------	------------------------------	-------------------	------------------