2023
TP-153

Course Specification
(Bachelor)

Course Title:	Non-Destructive Testing
Course Code:	391D-MEC-2
Program:	Bachelor of Science in Engineering
Department:	Mechanical Engineering
College:	College of Engineering
Institution:	Najran University
Version:	1.0
Last Revision Date:	27 February 2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐Required		☒ Elective		
3. Level/year at which this course is offered: (Fourth Year \ Level 8)					
4. Course general Description:					
This course provides students a synopsis of non-destructive and destructive evaluation methods that are used in evaluation of welds, castings and other methods of mechanical manufacturing. This includes understanding the basic principles of various NDT methods, fundamentals, discontinuities in different product forms, importance of NDT, applications, limitations of NDT methods and techniques and codes, standards and specifications related to non-destructive testing technology.					
5. Pre-requirements for this course (if any)**:**					
213-MEC-3 (Mechanics of Materials)					
6. Co-requisites for this course (if any)**:**					
NIL					
7. Course Main Objective(s):					
1. Be able to List and define different defects that occur in welding shown through Non-Destructive Examination/Destructive Testing. 2. Be able to identify the types of equipment used for each Non-Destructive and Destructive Examination. 3. Be able to explain the purpose of the Equipment, Application, and standard techniques required to perform major non-destructive and destructive examinations of welds. 4. Be able to go to specific Code, Standard, or Specification related to each testing method.					

5. Have the knowledge and essential skills to identify strengths and weaknesses in materials used in fabrication.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Impart knowledge of why NDT methods were initially developed and why Codes & Standards were initially developed	1	TS:1-Interactive lectures using PowerPoint slides with more examples in the class TS:2- Engaging the students in problem-based	-Test performance evaluation -Evaluation of participation in discussion and assignments -Quizzes and Mid Terms

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
			learning through tutorials TS:3- Recall the topics discussed in the last lecture by asking questions to the students. TS: 5 – Associating the topics in each chapter with the CLO. TS:6 – Conducting oral quizzes by the end of each chapter	
1.2	Make aware of functioning of different components and characteristics of non-destructive hardness testing.	7	TS:1-Interactive lectures using PowerPoint slides with more examples in the class TS:2- Engaging the students in problem-based learning through tutorials TS:3- Recall the topics discussed in the last lecture by asking questions to the students. TS: 5 – Associating the topics in each chapter with the CLO. TS:6 – Conducting oral quizzes by the end of each chapter	-Test performance evaluation -Evaluation of participation in discussion and assignments -Quizzes and Mid Terms
2.0	**Skills**			
2.1	Calculation of location of reinforcement and determining the profile of rebars and backing layer reinforcement	2	TS:1-Interactive lectures using PowerPoint slides with more examples in the class TS:2- Engaging the students in problem-based	-Test performance evaluation -Evaluation of participation in discussion and assignments -Quizzes and Mid Terms

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
			learning through tutorials TS:3- Recall the topics discussed in the last lecture by asking questions to the students. TS: 5 – Associating the topics in each chapter with the CLO. TS:6 – Conducting oral quizzes by the end of each chapter	
2.2	Understand the different aspects of FLAT JACK method for determining the elastic-strength properties of masonry structures.	6	TS:1-Interactive lectures using PowerPoint slides with more examples in the class TS:2- Engaging the students in problem-based learning through tutorials TS:3- Recall the topics discussed in the last lecture by asking questions to the students. TS: 5 – Associating the topics in each chapter with the CLO. TS:6 – Conducting oral quizzes by the end of each chapter	-Test performance evaluation -Evaluation of participation in discussion and assignments -Quizzes and Mid Terms
3.0	**Values, autonomy, and responsibility**			
3.1	Understand the consequences of placing parts at their respective positions.	4	TS:1-Interactive lectures using PowerPoint slides with more examples in the class TS:2- Engaging the students in problem-based	-Test performance evaluation -Evaluation of participation in discussion and assignments -Quizzes and Mid Terms

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
			learning through tutorials TS:3- Recall the topics discussed in the last lecture by asking questions to the students. TS: 5 – Associating the topics in each chapter with the CLO. TS:6 – Conducting oral quizzes by the end of each chapter	
3.2	Understand the need and importance of different types of NDT methods.	2	TS:1-Interactive lectures using PowerPoint slides with more examples in the class TS:2- Engaging the students in problem-based learning through tutorials TS:3- Recall the topics discussed in the last lecture by asking questions to the students. TS: 5 – Associating the topics in each chapter with the CLO. TS:6 – Conducting oral quizzes by the end of each chapter	-Test performance evaluation -Evaluation of participation in discussion and assignments -Quizzes and Mid Terms

C. Course Content

No	List of Topics	Contact Hours
1.	What is NDT? Historical disasters that affected the development of NDT. The birth of Codes and Standards NDT Qualification and Certification	8
2.	Characteristics of non-destructive hardness testing methods: principles, useful instruments, reports on the results and Characteristics of non-destructive ultrasonic pulse method: principles, useful instruments, reports on the results	8
3.	Characteristics of non-destructive resonance method: principles, useful instruments, reports on the results and Characteristics of the phase velocity method: principles, useful instruments, reports on the results	7
4.	Non-destructive method of search location of reinforcement, determining the profile of rebars and backing layer reinforcement	7
5.	FLAT JACK method for determining the elastic-strength properties of masonry structure	5
6.	Determination of the homogeneity of building materials and structures using statistical methods	5
7.	Experimental measurement and evaluation of results	5
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments	1-12	10%
2.	Quizzes	1-12	10%
3.	Mid-term	8	30%
4.	Final exam	15	50%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	**Non-Destructive Testing and Evaluation of materials** by J Prasad, C G K Nair, Tata McGraw Hill education private Limited.
Supportive References	**1. Non-Destructive Examination and Quality Control** by American Metals Society, Metals Hand Book, Vol. 17 9 th Ed, Metals Park, OH 1989. **2. Nondestructive Evaluation: A tool in Design, Manufacturing, and Service,** by Bray, Don E and Stanley, Roderic. K., CRC Press New York, Edition 1997
Electronic Materials	Online custom books
Other Learning Materials	N/A

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	Projector, White Board Marker
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Program Leaders and Peer Reviewer	Direct, Indirect
Effectiveness of Students assessment	Students & Faculty	Direct and Indirect
Quality of learning resources	Students & Faculty	Direct and Indirect
The extent to which CLOs have been achieved	Students & Faculty	Direct and Indirect
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT OF MECHANICAL ENGINEERING
REFERENCE NO.	
DATE	27/02/2024