

SOUTHEAST COMMUNITY COLLEGE
CONSTRUCTION MANUFACTURING AND TECHNOLOGY DIVISION
Nondestructive Testing Technology Program
Revision Date: August 24, 2020

I. CATALOG DESCRIPTION

Course Number: NDTT1450
Course Title: Eddy Current I
Prerequisite(s): MATH1050 and NDTT1260
Catalog Description: Study of electromagnetic theory and impedance plane diagrams as it applies to eddy current inspection. Applications and limitations of various test systems, operation of single frequency phase and amplitude analysis instrumentation. Calibration and data collection using various instrumentation/probe configurations.
Credit Hours: 4
Class Hours: 30
Lab Hours: 90
Total Contact Hours: 120

II. COURSE OBJECTIVES: *Course will:*

- A. Discusses the theory and establishes sound practices for construction and use of the impedance plane diagrams as it applies to eddy current examination on both ferrous and nonferrous materials.
- B. Introduces students to the basic architecture and use of analog and digital single frequency equipment used for eddy current examinations.
- C. Addresses the techniques and practices for performing various types of inspections which are conducted with eddy current examination including but not limited to conductivity measurements, nonconductive coating measurements, nonferrous material thickness measurements as well as crack detection.

III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES:

- A. Student Learning Outcomes: *Student will be able to:*
 - 1. Interpret the principles and theory which govern modern eddy current testing techniques and practices in an industrial service and manufacturing environment.
 - 2. Become proficient in the use of basic eddy current test and recording equipment for the purposes of calibrations and testing of material properties including material thickness measurement, conductive and nonconductive coating material thickness measurement, electrical conductivity measurements and crack detection.
 - 3. Exhibit proficiency in his/her ability to conduct independent eddy current examinations in accordance with recognized codes, standards, specifications, and procedures and correctly report findings.
- B. General Education Learning Outcomes (GELOs)
 - 1. GELO #3: Critical Thinking & Problem Solving
Outcome 1: Collect, identify, interpret and analyze data.

IV. CONTENT/TOPICAL OUTLINE *(course outline may provide detailed information)*

- A. Introduction to electromagnetic testing
- B. Electrical Fundamentals
- C. Electrical and electromagnetic relationships
- D. Test system analysis

- E. Test coil design and factors effecting performance
- F. Effects of conductivity variables on test results
- G. Effects of permeability on test results
- H. Single side and through transmission test systems
- I. Coupling factors
- J. Distribution of eddy currents in test specimens
- K. Amplitude analysis inspection techniques

V. INSTRUCTIONAL MATERIALS

- A. Required Text(s): Hagemmaier's, Donald J., *Fundamentals of Eddy Current Testing*
- B. Supplies:
 - 1. Notebook
 - 2. Scientific calculator
 - 3. French curve set
 - 4. 0-1" outside micrometer with Vernier scale
 - 5. Olympus/Staveley eddy current slide ruler

VI. METHODS OF PRESENTATION/INSTRUCTION

- A. Methods of presentation typically include a combination of the following:
 - 1. Lecturing
 - 2. Small and large group discussion
 - 3. Video presentations
 - 4. Demonstrations
 - 5. Handouts
 - 6. Observations
 - 7. Assigned lab projects
 - 8. Field trips

VII. METHODS OF EVALUATION (*course outline may provide more detailed information*)

- A. Methods of evaluation, although determined by the individual instructor, traditionally includes a combination of the following:
 - 1. Homework
 - 2. Quizzes
 - 3. Tests
 - 4. Lab grades
 - 5. Attendance/class conduct

VIII. SPECIFIC COURSE REQUIREMENTS

- A. Attendance
- B. Examination/Quizzes
- C. Homework
- D. Lab Projects
- E. Must earn a final grade of 70% (2.0) or higher.