University of Toledo
Construction Engineering Technology
Master Syllabus

Course Title: Materials Testing **Course Code & Number:** CET-2110

Credit Hour Total: 3 **Weekly Contact Hours Lecture:** 2 **Lab Hours:** 2

Prerequisite(s): CET-1150

Text: Materials for Civil & Construction Engineers, 3rd Ed.
Mamlouk & Zaniewski, ISBN: 9780136110583
ACI Certification Concrete Field
Testing Technician Grade 1
Technician Workbook
Publication CP-1 (13) American Concrete Institute

Software: None

Course Coordinator: Mata

A. **Course Description** (Approved catalog description.)

Design of portland and asphalt cement concrete mixes and associated quality control tests of mortar, aggregates, asphalt cements, portland and asphaltic concrete.

B. **Related Program Outcomes:**

Upon successful completion of the Construction Engineering Technology program, graduates will have:

ABET/Student Outcomes

a. an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities;
c. an ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes;
e. an ability to function effectively as part of a team;

Program Criteria Outcomes

2. A development of mathematical skills sufficient to solve and analyze technical problems associated with construction projects including building, highway and heavy construction.

4. The ability to demonstrate a thorough knowledge of common construction materials- both their proper usage and proper testing procedures.

8. An understanding of codes and specifications in the implementation of building and highway projects.

Evidence of the success of these outcomes is provided by the collection and analysis of:

- Aggregate Gradation On Concrete Compressive Strength
- ACI Concrete Field Testing Technician Grade 1 Exam
- Final Exam Results

C. **Course Objectives:**

Upon the completion of this class the student will:

1. Gain an understanding of Portland cement concrete properties and mix designs, standard quality testing procedures and construction techniques.
2. Gain an understanding of asphaltic cement concrete properties and mix design, standard quality testing procedures and construction techniques.
3. Gain an understanding of the principles of mortar, metals and geotextile quality control testing.
4. Gain an understanding of aggregate gradation and standard quality control testing.
5. Obtain the ability to apply statistical analysis techniques to quality control testing of construction materials.

D. **Course Outline – Major Content Areas**

1. Concrete Fundamentals & Quality Control
2. Concrete Mix Design
3. Concrete Components
   i) Water
   ii) Air
   iii) Admixtures
   iv) Aggregates
4. Concrete Construction (Batching, Mixing, Placing, Finishing, Curing)
5. Asphalt Cement Properties
6. Aggregates for Asphaltic Concrete
7. Hot Mix Asphalt Design and Mixture Properties
8. Mortar
9. Metals
10. Wood

E. **Suggested Laboratory Tests**

1. Concrete Mix Design
2. Concrete Quality Control Testing
3. Concrete Compressive & Flexural Strength Testing
4. Aggregate Analysis (Gradation, Absorption, Abrasion Resistance)
5. SHRP Testing of Aggregates
6. Asphalt Cement Quality Control Testing
7. Asphaltic Concrete Mix Design & Quality Control Testing
8. Metals Tensile Strength Testing