South Central College

CTLS 1820 Materials Technology

Course Outcome Summary

Course Information

Description This course covers the types of materials, construction methods, and quality control necessary in the construction of driven surfaces. The course examines basic geology with soil identification and classification for base construction, materials evaluation, testing methods for quality assurance in grading and base, bituminous surfacing, and concrete surfacing. This course is based on MnDOT certification requirements in the areas of Aggregate Production and Concrete Field 1. (Prerequisite: MATH 0075 with a grade of C or above, or an Accuplacer Arithmetic score of 56 or above.)

Total Credits 4

Total Hours 80

Types of Instruction

Instruction Type	Credits/Hours
Lecture	3/48
Lab	1/32

Pre/Corequisites

Successful completion of MATH 0075 with a grade of C or above, or an Accuplacer Arithmetic score of 56 or above.

Institutional Core Competencies

Critical and Creative Thinking - Students will be able to demonstrate purposeful thinking with the goal of using a creative process for developing and building upon ideas and/or the goal of using a critical process for the analyzing and evaluating of ideas.

Course Competencies

1. Describe basic geological components of rocks

Learning Objectives

Identify the rock formation process
Summarize igneous rock properties
Summarize sedimentary rock properties
Summarize metamorphic rock properties

2. Explain the geological history of Minnesota

Learning Objectives

Describe significant geological time periods
Identify the major glacial events in Minnesota
Analyze glacial depositional features
Summarize the impacts of glaciers on aggregate production

3. Analyze aggregates

Learning Objectives

Summarize aggregate availability and quality
Outline aggregate operation
Examine mining
Examine crushing
Examine grading
Examine washing

4. Analyze aggregate sampling

Learning Objectives

Describe stockpiling
Examine handling of aggregates
Analyze sampling coarse aggregates
Analyze sampling fine aggregates
Identify the rate of required sampling

5. Identify aggregate testing procedures

Learning Objectives

Analyze coarse and fine aggregate sieve analysis
Perform coarse and fine aggregate sieve analysis
Summarize gradation
Perform gradation
Analyze specific gravity
Perform specific gravity
Describe spall content, percent crushed, and flat & elongated
Identify safety procedures required for aggregate testing

6. Review the MnDOT specifications for aggregate

Learning Objectives

Examine the MnDOT specification manual
Analyze section 1501 thru 1609 in the MnDOT standard specifications for construction
Examine MnDOT plans and standard details for aggregate

7. Identify concrete basics

Learning Objectives

Describe the components of concrete
Describe heat of hydration
Describe workability
Describe durability
Relate concrete strength to age
Correlate uses for air entrainment
Describe water/cementitious ratio

8. Define the materials used for concrete

Learning Objectives

Contrast portland cement types
Describe blast furnace slag
Correlate blended cements
Describe fly ash
Describe silica fume

Contrast chemical admixtures

9. Review the MnDOT mixes and specifications

Learning Objectives
Examine the MnDOT specification manual
Analyze specification section 2461
Review guidelines for slump adjustment

10. Identify concrete field test and procedures

Learning Objectives
Analyze sampling for concrete
Analyze compressive strength tests
Perform compressive strengths tests
Analyze flexural strength tests
Perform flexural strength tests
Analyze slump, air, and temperature tests
Perform slump, air, and temperature tests
Identify safety procedures required for concrete testing

11. Examine required documentation for concrete

Learning Objectives
Utilize a schedule of materials control
Analyze concrete tickets
Examine MnDOT certificate of compliance
Examine MnDOT concrete field testing performance checklists

12. Complete MnDOT Certification

Learning Objectives
Pass the MnDOT certification test in Aggregate Production
Pass the MnDOT certification test in Concrete Field 1

SCC Accessibility Statement

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Additional information and forms can be found at: www.southcentral.edu/disability

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