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

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Additional information and forms can be found at:  [www.southcentral.edu/disability](http://www.southcentral.edu/disability)

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