

Course Name:

Pavement Design and Lab

Course Number:

20436

Credit:

3

Prerequisite:

Soil Mechanics

Course Description (Objectives):

Introducing various pavement systems and their construction, materials of construction for different pavement layers, methods of grading asphalt binders, asphalt technology, analysis and design of asphalt pavement structures, maintenance and rehabilitation of pavements.

Course Content (outline):

- Function of pavement and types of pavements (flexible and rigid).
- Technical specifications of different pavement layers.
- Types of asphalt cement (binders), methods of binder grading based on penetration, viscosity and performance grading (PG), classic and advanced binder characterization tests.
- Asphalt technology; different asphalt mixtures, mixture volumetric analysis, Marshal mix design.
- Environmental effects on pavement and pavement drainage.
- Elastic analysis of stresses in flexible pavement.
- Traffic quantification and determination of equivalent axle load factors (EALFs)
- Characterization of unbounded and bounded materials for various layers.
- Design of pavement structures using the Asphalt Institute and 1993 AASHTO methods.
- Pavement distresses (type, cause and remedy).
- Overview of preventive maintenance methods and rehabilitation.
- Overview of mechanistic design of pavements using the AASHTO Mechanistic Empirical Pavement Design Guide (MEPDG).

Lab

- Aggregate proportioning for asphalt mixtures
- Tests on asphalt cements; penetration, viscosity, flash point, ductility, solubility, specific gravity, and softening point.
- Asphalt mixture tests; specific gravity, density, Marshall stability, extraction.
- Visiting the Superpave asphalt research lab.

References:

- Traffic and Highway Engineering, N. Garber and L.A. Hoel, Third Edition.
- Pavement Analysis and Design, Y. H. Huang, Pearson Prentice Hall, 2004.
- Mix Design Methods for Asphalt Concrete and Other Hot Mixes, Manual Series No. 2 (MS-2), Asphalt Institute, Lexington, KY, 1994