One Week Short-Term Course on

Transportation Geotechnics (TraGeo)

Sponsored by Ministry of Education (MoE), Government of India, New Delhi,
Under the program 'Global Initiative of Academic Networks' (GIAN)

9th – 13th December 2024

Course overview:

Transportation geotechnics is a crucial field that plays a pivotal role in ensuring safe and efficient movement of people and goods on our roadways, railways, and other transportation infrastructure. By studying the behavior of soils and rocks in the context of transportation projects, pavement/railroad engineers can design and construct stable and durable foundations, embankments, tunnels, and retaining walls. Understanding the properties of the underlying ground is essential for preventing failures, minimizing settlements, and ensuring adequate performance under traffic loading. By addressing geotechnical challenges appropriately, transportation infrastructure can become more resilient, cost-effective, and sustainable, thus improving the overall safety and connectivity of our global transportation networks.

Additionally, transportation geotechnics plays a crucial role in environmental preservation and sustainability. With the growing emphasis on reducing carbon emissions and promoting eco-friendly practices, geotechnical engineers are tasked with developing transportation infrastructure that has minimal impact on the environment. By carefully selecting construction materials and designing solutions that minimize excavation and disturbance of natural landscapes, transportation projects can coexist harmoniously with their surroundings, preserving ecosystems and biodiversity. The geotechnical aspects are particularly important today, as longer pavement performance (analysis) periods are being used in design, and the axle loads for trains keep increasing with time. The maintenance and rehabilitation activities used for the transportation infrastructure require a competent support from the underlying geo-materials.

This course has been developed to provide a thorough understanding of the geotechnical aspects as they apply to the analysis, design and construction of pavement and railroad infrastructure. The overall goal is to enhance current practices in India, and to facilitate the design construction, and maintenance of better-performing, longer-lasting, cost-efficient transportation infrastructure.

This is a specialized course, which can be taken by higher level undergraduate students, post graduate students and research scholars working in this area of transportation engineering. Also practicing civil engineers would find this course very helpful. Internationally acclaimed academic professional will deliver lectures in the course and discuss the design concepts followed worldwide. The course has be planned and offered as per the norms set by IIT Bhubaneswar.

The primary objectives of this course are to create understanding the following amongst the participants:

(a) Geotechnical Aspects of Pavements and Railroads
(b) Subgrade Evaluation Procedures
(c) Laboratory characterization of geo-materials for pavement and railroad applications
(d) Stress-Dependent behaviour of geo-materials, and their effects on pavement and railroad performance

Course content:

- Pavement and Railroad Track Design Philosophy and Historical Development
- Pavement and Railroad Substructure Layers and their Importance
- Mechanistic-Empirical Design Framework
- Laboratory and Field Methods for Subgrade Evaluation
- Introduction to geo-material mechanical properties
- Shear Strength Characterization of soils, aggregates, and railroad ballast
- Repeated Load Behavior of Soils, Aggregates, and Railroad Ballast
- Resilient Modulus Testing and Model Development
- Permanent Deformation Testing and Model Development
- Anisotropic Behavior of Unbound Aggregates and its Effects

Who can attend?

- Practicing civil engineers, researchers, and executives in the areas of civil, transportation engineering from various private and government organizations.
- Faculty members of academic institutions and R&D centres.
- UG, PG. and Ph.D. students working in the areas of civil & transportation engineering.

Details regarding course participation are available at **https://gian.iith.ac.in/**

Course period and venue:

Duration: 9th – 13th December 2024

Venue: School of Infrastructure
Indian Institute of Technology Bhubaneswar
Argul, Jatni, Khurdha-752050, Odisha, India

Course fee:

- Students: 1000/-
- Participants from academic/research/technical institutions and R&D units: Rs. 2000/-
- Participants from industries: Rs, 5000/-
- Participants from abroad: US$ 100

The fee includes all instructional materials, computer use for tutorials and assignments, and laboratory equipment usage charges. The course fee does not include accommodation. However, the participants will be provided accommodation on payment basis in the institute guest house based on availability. **GST @18% is extra**.

This Payment can be made via NEFT transfer, in favour of *"CEP IIT Bhubaneswar", A/C. No: CEP, IIT Bhubaneswar, A/c No. 24282010001960, Canara Bank, IFSC: CNRB0017282* or through Demand Draft, in favour of "CEP IIT Bhubaneswar" payable at Bhubaneswar.

Registration:

Register for the course online at:
https://docs.google.com/forms/d/1solam811ORB-3MzOT74Kq_1LRLBce5umMp0OZy36SWM/edit?pli=1
The last date of registration is 20th October 2024.
Number of participants for the course is limited to 50.

Course faculty:

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Dr. Debakanta (Deb) Mishra is an Associate Professor in the School of Civil and Environmental Engineering at Oklahoma State University, where he teaches courses in the areas of geotechnical engineering, pavement engineering, and railroad engineering. He joined OSU in August 2019 after spending 5 years as an Assistant Professor in the Civil Engineering Department at Boise State University. Prior to that he completed his Ph.D. and post-doctoral work at the University of Illinois at Urbana-Champaign. He obtained his B.Tech. degree in Civil Engineering from IIT Kanpur.

Dr. Mishra has research interests in the generic areas of Infrastructure Materials, Pavement Engineering, Railroad Engineering, and Transportation Geotechnics. His research has encompassed the following topics: (1) Performance Monitoring of Transportation Infrastructure through Advanced Instrumentation; (2) Design and Development of Advanced Laboratory Equipment for Infrastructure Material Characterization; (3) Numerical and Analytical Modelling of Transportation (Pavement and Railroad) Infrastructure; and (4) Sustainability Quantification in Pavement and Railroad Engineering.

He has authored more than 80 technical papers in referred journal and conference proceedings. He serves as an active member of several Transportation Research Board (TRB) and American Society of Civil Engineers (ASCE) committees. He was the chair of the TRB Unbound Granular Material Sub-Committee (AKM80(1)) between 2016 and 2022. Since January 2023, he has taken over as the Committee Research Coordinator for the Aggregates Committee (AKM80).

Course coordinator:

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Dr. U. C. Sahoo is working as an Associate Professor in the School of Infrastructure, Indian Institute of Technology Bhubaneswar. His areas of research interest include Pavement Analysis and Design, Pavement Materials, Pavement Evaluation, Low Volume Roads etc. Presently he is working on Transportation Geotechnics, Cool Pavements, Cold Mix Asphalt, Sustainability and Climate Resiliency in Pavement Construction etc.