

# Design of Ballasted Railway Track: Current Practices and New Developments

## Overview

Rail transport forms a significant part of the transportation infrastructure in a country and plays a major role in economic progress. Recent traffic congestion of roadways in many countries around the globe has driven railways to grow into the most popular means of public transportation, which has increased the demand for heavier and faster trains. Indian Railways is geared up to improve its infrastructure to fulfill the future need of growing traffic.

This course brings together fundamental concepts, current practices, recent developments, and some of the Australian experience in the design of ballasted railway tracks. This course discusses various parameters required for the ballasted railway track design and details the procedures for calculating the bearing capacity of ballast. The impact of ballast breakage and ballast fouling will also be discussed in the course using realistic examples. Further, the role of geosynthetics on track settlement and load-deformation characteristics of geogrid-reinforced ballast will be discussed. Further lectures identify the design procedures for the sub-ballast and filtration layer. A lecture on railway track infrastructure in India highlights the current trends and possible solutions to ballasted railway track problems of India. This course intends to equip and enhance the capabilities of engineers, researchers, and students to design the ballasted railway track efficiently. The primary objectives of the course are as follows:

- i) Introducing participants to the fundamentals and parameters of ballasted railway track design
- ii) Exposing participants to the procedures of determining the bearing capacity of ballasted railway track, and the thickness of the granular layer
- iii) Exposing participants to the application of geosynthetics in railway tracks
- iv) Providing exposure to problems such as ballast breakage, and ballast fouling, and their solutions, through case studies
- v) Enhancing the capability of the participants to design ballasted railway tracks efficiently through worked-out examples

<b>Modules</b>	Lectures: 12 hours, Tutorials: 04 hours, Duration: 05 days (03-07 July 2023)
<b>You Should Attend If...</b>	<ul style="list-style-type: none"><li>▪ You are a post-graduate student in any specialization of Civil Engineering</li><li>▪ You are working as a Research Scholar / Engineer / Research Scientist from government organizations including R&amp;D laboratories and private firms</li><li>▪ You are a faculty from an academic institution/researcher working in any sector and interested in railway track design</li></ul>



शिक्षा मंत्रालय  
MINISTRY OF  
EDUCATION

सत्यमेव जयते



॥ सा विद्या या विमुक्तये ॥  
भारतीय प्रौद्योगिकी संस्थान धारवाड  
Indian Institute of Technology Dharwad



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## Course Fee and Extra Fee

Single-room accommodation will be provided in student hostels on a first-come, first-served basis. Participants must fill out the Google Sheet for accommodations prior to their arrival (<https://forms.gle/itfBP3EcTuD5w14z6>). *This 'extra fee' can only be paid at the time of registration on arrival at the campus.*

Course Fee (including 18% GST)	Extra Fee Per Day (including 18% GST)
Practicing Engineers from public and private sector	₹ 5,000
Academic (Faculty) & Research (Scientists) Staff	₹ 2,500
Postgraduate & Doctoral Students	₹ 1,000
Participants From Abroad	US \$ 200
	For accommodation only ₹ 200
	For food (breakfast, lunch, dinner, and refreshments on course session days) only ₹ 400
	For both food and accommodation ₹ 600
	<i>Procedure for paying 'course fee' is detailed below</i>

## Venue (IIT Dharwad)



## How to register ?

### **Step 1: GIAN Web (Portal) Registration: (Individuals who have already registered to GIAN earlier do not need to repeat)**

Visit <https://gian.iitkgp.ac.in/GREGN/index> and create a login User ID and Password. Fill up the blank registration form and do web registration by paying Rs. 500/- online through Net Banking/Debit/Credit card. This gives the user lifetime registration to enroll in any GIAN courses offered.

**Please do not confuse GIAN web registration with course registration. The course registration fee is separate. The candidate must pay course registration fee as per step 3 given below.**

**Step 2: Course Registration (Through GIAN Portal)** Log in to the GIAN portal with the user ID and password already created in Step 1. Click on the "Course Registration" option at the top of the Registration form. **Select the Course** titled " Design of Ballasted Railway Track: Current Practices and New Developments" from the list and **click on the 'Save' option and confirm your registration by Clicking on "Confirm Course."** Once you enroll for the course, an Enrolment/Application number will be generated, and the course coordinator will be notified.

### **Step 3: Confirmation from the Course Coordinator and Course Fee Payment (Only selected candidates)**

Only Selected Candidates will be intimated through e-mail by the Course Coordinator. They must remit the necessary course fee through online payment gateway of IIT Dharwad intimated through the email. The online payment receipt along with the copy of the filled in google form (<https://forms.gle/1Lofn1Ju8Tflr7JC9>) should be sent to: Dr. B. Giridhar Rajesh, [bgr@iitdh.ac.in](mailto:bgr@iitdh.ac.in)

**Last date for Course Registration: 23<sup>rd</sup> June 2023**

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## About the Speakers

### *International Expert*



**Prof. Sanjay Nimbalkar** is an Associate Professor in the School of Civil and Environmental Engineering at the University of Technology Sydney (UTS) in Australia. His research interests include railway embankment stability analyses, earth retaining structures, ground improvement approaches, circular economy, tailing dams, and constitutive and numerical modelling. He is a Chartered Professional Engineer: CPEng (Engineers Australia). He is the recipient of the "Thomas Telford Premium Award" from the Institution of Civil Engineers (ICE), UK (2014) and the "Professor Joseph M. Sussman Best Paper Prize" from Frontiers in Built Environment, Switzerland (2020). He is a EMCR fellow of the Australian Academy of Science, which is funded by the Australia-India Strategic Research Fund (AISRF) (2020-2022). He is a lead Chief

Investigator of recently concluded joint research project on "Heavy-haul Indian Railway: Towards Safe, Efficient and Sustainable Design" funded by Australia-India Council. He is a strong advocate of Australia and India working together to share high-quality technical knowledge for designing, building, and maintaining sustainable railway tracks, having successfully led a number of collaborative initiatives involving Australian and Indian scholars. In addition, he is an adjunct faculty member at the Indian Institute of Technology Madras and an adjunct Associate Professor at the Indian Institute of Technology Bombay.

### *National Expert*



**Prof. Deepankar Choudhury** is Prof. T. Kant Chair Professor (HAG) & Head of the Civil Engineering Department at the Indian Institute of Technology (IIT) Bombay, Mumbai, India. His major research interests include Soil Dynamics, Geotechnical Earthquake Engineering, and Computational Geomechanics. Prof. Choudhury also worked as a Visiting Fellow/Faculty at NUS Singapore, UoW Australia, UC Berkeley USA, Kagoshima Univ. Japan, TU Darmstadt Germany and Incheon National Univ. South Korea. Prof. Choudhury is the only Geotechnical Engineer in India who is an elected Fellow (FNASc) of the oldest Science Academy of India, viz. The National Academy of Sciences, India. Internationally he is an Alexander von Humboldt Fellow of Germany, JSPS Fellow of Japan, and TWAS-VS Fellow of The World Academy of Sciences, Italy, in addition to National Fellow of the Institution of Engineers India (FIE) and Indian Geotechnical Society (FIGS).

### *Host Faculty*



**Dr. B. Giridhar Rajesh** is an Assistant Professor at the Indian Institute of Technology Dharwad, India. His research experience lies in the areas of Soil Dynamics, Geotechnical Earthquake Engineering and Ground Improvement techniques. He completed his Ph.D. in Civil Engineering from IIT Bombay, India. He is a recipient of the IGS-FERROCO YGE best paper award for 2016. He also received Best Ph.D. thesis award for the period 2017-2019 for outstanding research contributions from the Indian Institute of Technology Bombay, Mumbai, India. He is a recipient of the IACMAG Excellent Paper Award-2022 from the International Association for Computer Methods and Advances in Geomechanics (IACMAG), USA.

Course Coordinator: Dr. B. Giridhar Rajesh; Phone: +91-9490935916

Email: [bgr@iitdh.ac.in](mailto:bgr@iitdh.ac.in)