



ADVANCED FOUNDATION ENGINEERING

PROF. KOUSIK DEB

Department of Civil Engineering

IIT Kharagpur

PRE-REQUISITES : BE Students can take after completing third year or after completing "Soil Mechanics" and "Foundation Engineering" courses. ME and PhD students can take during first semester of their course work.

INTENDED AUDIENCE : UG and PG students. Research Scholars and Practicing Engineers can also take this course.

INDUSTRIES APPLICABLE TO : Most of the Civil Engineering companies

COURSE OUTLINE :

The course will focus on the design of shallow foundation on sloping ground, layered soil and under inclined & eccentric loading conditions. Piles under uplift and lateral loading conditions will also be discussed. In the undergraduate core course on Foundation Engineering, these topics are either not covered or discussed in simplified form. In the proposed course, these advanced topics will be discussed in detail. This course is useful for both UG and PG student. The course is also suitable for students who are preparing for competitive examination. Field Engineers can be benefited from this course as the design of foundations under critical conditions (those are not generally covered in UG core foundation engineering course) will be discussed here.

ABOUT INSTRUCTOR :

Prof. Kousik Deb is presently working as Associate Professor in Civil Engineering at IIT Kharagpur. Dr. Deb has more than 11 years of research experience and working in the areas of Geosynthetic- Reinforced Earth, Numerical Modeling, and Embankment stability. He has published/accepted 100 research articles including about 60 papers in referred journals. He has developed number of numerical and analytical models to study the behavior of improved grounds, embankment stability and underground structures. Under Dr. Deb's guidance, 5 Ph.D. are awarded and 5 more are in progress. He has also supervised 13 M.Tech dissertations. Dr. Deb has completed 2 sponsored research projects funded by DST. He has successfully completed more than 12 consultancy projects. As a visiting research fellow at RWTH, Aachen, Germany under DAAD Fellowship; He is the recipient of IIT Roorkee Shamsheer Prakash Research Award for outstanding research contribution in Geotechnical Engineering by Young Indian Researcher. He also received IEI Young Engineers Award; Excellent Paper Award to Junior Individuals-2008 given by International Association for Computer Methods and Advances in Geomechanics (IACMAG), USA. Dr. Deb also selected for Endeavour Research Fellowship to undertake a Postdoctoral Research programme in Australia. Dr. Deb has gained expertise in the cutting edge technologies on ground improvement such as applications of geosynthetics in roadways. Dr. Deb has offered course on Foundation Engineering under NPTEL Online Certification Programme.

COURSE PLAN :

Week 1: Introduction, planning of soil exploration for different projects, methods of borings along with various penetration tests, geophysical soil exploration.

Week 2: Shallow foundations, methods of estimating bearing capacity of footings and rafts, foundations under eccentric loading.

Week 3: Foundations under inclined loading, foundations on slope, foundations with tilted base.

Week 4: Bearing capacity of foundations on layered soil.

Week 5: Methods of estimating settlement of footings and rafts. Concept of Beams on Elastic Foundation.

Week 6: Concept of Beams on Elastic Foundation (continued).

Week 7: Proportioning of foundations using field test data, IS codes.

Week 8: Pile foundations, pile load tests, methods of estimating load transfer of piles, analytical estimation of load settlement behavior of piles.

Week 9: Pile group capacity and settlement, negative skin friction of piles.

Week 10: Laterally loaded piles.

Week 11: Uplift capacity of piles, foundations/anchors under uplift loads, well foundation, bearing capacity of well foundations, lateral stability of well foundations.

Week 12: IS and IRC codal provisions, elastic theory and ultimate resistance methods for well foundations, foundations on problematic soils: foundations for collapsible and expansive soil.