

ATAL (AICTE Training and Learning) Academy Faculty Development Programme (Online Mode)

on

Mathematical Modelling of Problems

in

Coastal and Offshore Engineering

September 14 - 18, 2020

Organized by Department of Mathematics, IIT Guwahati

Invitation

The Department of Mathematics, IIT Guwahati cordially invites and welcomes you to the ATAL (AICTE Training and Learning) Academy Faculty Development Programme on **Mathematical Modelling of Problems in Coastal and Offshore Engineering** during September 14 -18, 2020.

Course Objectives

Study of various aspects of coastal and offshore engineering has received immense attention over the last few decades for a good number of important applications. Protecting coastal and offshore structures from harsh wave action, installation of structures in oceans, oscillation and motion of marine structures, evaluation of wave forces, study of bottom topography, flexural gravity waves etc. are some very important and practical topics that require rigorous involvement of mathematicians, engineers and designers. Finding appropriate solutions for problems arising in these areas is a foremost requirement. In this context, mathematics plays a very important role in converting the physical problems into appropriate forms. Methods/techniques such as special functions, Green's function, perturbation technique, integral transforms, integral equations etc., are very important and useful from the point of view of applications in various branches of science and engineering, including coastal and ocean engineering. This proposed FDP will provide some of the key mathematical techniques that are encountered in academic research. Mathematical modelling of real life problems is an important aspect of applied mathematics which caters to various areas of applied science and engineering. It is aimed, through this FDP, to throw light on the basic theory of water waves and understanding of various ocean engineering problems. Appropriate use of mathematical tools in formulating and solving different types of coastal and offshore engineering problems will be displayed. In this modern world where physical phenomena are highly nonlinear, linearizing the problems and finding solutions to various practical problems assumes significance. Idea of water wave theory and related physical conditions, various mathematical tools, formulation, methodology and solutions of various practical problems pertaining to coastal and offshore engineering will be presented in this week-long FDP. Experienced researchers will provide the necessary background for taking up different types of problems encountered in ocean.

About IIT Guwahati

Indian Institute of Technology Guwahati, the sixth member of the IIT fraternity, was established in 1994. The academic programme of IIT Guwahati commenced in 1995. At present the Institute has eleven departments and five inter-disciplinary academic centres covering all the major engineering, science and humanities disciplines, offering BTech, BDes, MA, MDes, MTech, MSc and PhD programmes. Within a short period of time, IIT Guwahati has been able to build up world class infrastructure for carrying out advanced research and has been equipped with state-of-the-art scientific and engineering instruments.

Department of Mathematics

The Department of Mathematics at IIT Guwahati, since its very inception in 1995, has strived to be a centre of excellence in mathematics and computing, and it has been vigorously engaged in research, teaching and training. Having started the PhD programme in 1996, the department initiated a 2-year M.Sc. programme in Mathematics and Computing in 2000. From academic year 2006-2007, the department started a unique 4-year B.Tech. programme in Mathematics and Computing - the first of its kind in the country. An interdisciplinary M.Tech. Programme in Data Science jointly offered by three Departments, namely, Mathematics, Computer Science & Engineering and Electronics & Electrical Engineering has been started in 2019.

Topics

- Differential Equations (Special Emphasis: Special Functions, Green's functions), Integral Transforms, Singular Integral Equations
- Basics of Fluid Dynamics
- Multi-phase Flow
- Fracture Mechanics
- Water Waves: Basic Theory and Applications
- Application of Various Mathematical Techniques to Water Wave Problems
- Different Ocean Upper Surfaces and Bottom Topography
- Two-layer Fluid Problems in Water Wave Scattering
- Trapping of Water Waves
- Very Large Floating Structures (VLFS) in Ocean
- Interaction of Water Waves with Various Types of Structures
- Numerical Solution of Differential Equations

Mode of delivery of Lectures

All activities will take place online through a suitable platform which will be conveyed to all selected participants in due course of time.

Time Table

Time table for 15 lectures will be made available in the last week of August.

Resource Person

- Prof. Birendranath Mandal, Retired Professor, Indian Statistical Institute Kolkata
- Prof. Trilochan Sahoo, Department of Ocean Engineering and Naval Architecture, Indian Institute of Technology Kharagpur
- Prof. Durga Charan Dalal, Department of Mathematics, Indian Institute of Technology Guwahati
- Prof. Gautam Barua, Department of Civil Engineering, Indian Institute of Technology Guwahati
- Prof. S. Natesan, Department of Mathematics, Indian Institute of Technology Guwahati
- Prof. KSRK Murthy, Department of Mechanical Engineering, Indian Institute of Technology Guwahati
- Dr. Subash Chandra Martha, Department of Mathematics, Indian Institute of Technology Ropar
- Dr. Smrutiranjana Mohapatra, Department of Mathematics, Veer Surendra Sai University of Technology, Burla, Odisha.
- Dr. Santu Das, Division of Mathematical and Computational Sciences, Institute of Advanced Study in Science and Technology, Guwahati
- Dr. Sunanda Saha, Department of Mathematics, Vellore Institute of Technology, Vellore
- Prof. Swaroop Nandan Bora, Department of Mathematics, Indian Institute of Technology Guwahati

Who Can Apply

- Faculty members of the AICTE approved institutions
- Research scholars, PG Scholars from government institutes
- Government, Industry participants (Bureaucrats/Technicians / Participants from Industry)
- Staff of host institute (maximum 30% of total participants)
- Only Indian Nationals

How to Apply

- Signup with ATAL Academy at <https://atalacademy.aicte-india.org/signup>
- Fill in all necessary details and upload documents, if asked.
- Follow all instructions as given.

Information

- Selection of candidates will be as per the existing policy of ATAL Academy rules and regulations.
- The Coordinator will finalize the list of participants in consultation with the officials of ATAL Academy.
- All activities will take place online through a suitable platform the details of which will be conveyed to all selected participants in due course of time.
- Attendance will be marked for each lecture
- A Test is likely to be conducted at the end of all lectures.
- E-certificate will be issued only to those participants who maintain a very good attendance.
- New information will be displayed as and when required. Check this site at regular interval.

Coordinator

Prof. Swaroop Nandan Bora
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<https://www.iitg.ac.in/maths/people/facultist.php?id=swaroop>