About The Course

The Short-Term Course on Hydrodynamic Design Aspects of High-Speed Crafts is designed to provide intensive learning on the fundamental and advanced principles governing the hydrodynamic performance, stability, and design of high-speed marine vehicles. The course offers a comprehensive understanding of the theoretical concepts and practical considerations involved in the design and operation of planing craft, hydrofoils, air-cushion vehicles, and surface-effect ships. Structured to provide a balanced mix of lectures, computational demonstrations, case studies, and experimental insights, the course enables participants to develop both conceptual understanding and practical design skills. It is particularly suited for students, researchers, practicing engineers, and professionals interested in high-speed marine transportation and advanced marine vehicle design.

Objective

The primary objective of this course is to provide participants with a strong foundation in the hydrodynamic principles that govern the performance of high-speed vehicles. The course aims to bridge theoretical concepts with practical applications by combining lectures, computational tools, and experimental demonstrations

Scope

- After successful completion of the course, the participants will be able to
- Memorise and explain the fundamental concepts governing the design and operation of high-speed crafts involving the hydrodynamic considerations
- Apply and analyze resistance, propulsion and power characteristics of high-speed crafts using empirical, analytical and numerical methods
- Analyze and evaluate the influence of hull form, weight distribution, stability and seakeeping performance on the overall efficiency and safety of high-speed crafts
- Apply hydrodynamic design considerations to develop preliminary designs for various categories of high-speed crafts, namely, planing crafts and surface-effect vessels

Course Content

1. Hydrodynamics of small high-speed craft– Emphasis will be on Planing Monohulls, Other hull forms, including hydrofoil craft, air cushion vehicles and surface effect ships will be discussed
2. Fundamentals of Resistance– Potential Flow, Viscous Flow, Major Components of Resistance, Effect of Speed on Resistance and Hull form
3. Planing Theory: Semi-empirical methods for resistance and attitude prediction, Lift and drag characteristics of planing surfaces, Other components of resistance, Appendage Drag, Spray Drag, Air/Wind Drag, Added Resistance in waves
4. Dynamic Stability of high-speed marine vehicles.
5. Performance in Waves: People Comfort, Structural design consideration, Seakeeping fundamentals for high-speed craft, Slamming and dynamic load pathways, Motion comfort considerations and operational limits, Structural sizing drivers (practical overview)
6. Manoeuvring Characteristics

A Short Term Course on Hydrodynamic Design Aspects of High-Speed Crafts

IIT Kharagpur
PLATINUM JUBILEE

(8th to 14th October,2026)

Organized by
Department of Ocean Engineering & Naval Architecture, IIT Kharagpur

Who can attend

- Undergraduate and Postgraduate Students
- Research Scholars and Academicians
- Industry Professionals from Marine/Offshore Sectors

About Resource Person

Dr. O. P. Sha retired as Professor (Emeritus) from Department of Ocean Engineering and Naval Architecture, IIT Kharagpur in Dec 2025 after more than four decades of teaching, research and handling sponsored projects and industrial consultancy. He is currently working as a consultant to Garden Reach Shipbuilders and Engineers, Kolkata and the Chairman of Naval Research Board, DRDO, Govt. of India.

Raju Datla is a Research Professor and NAVSEA Professor of Naval Engineering at Stevens Institute of Technology. He manages the experimental marine hydrodynamics research at the Davidson Laboratory. His expertise is in the areas of high-speed craft hydrodynamics and ocean engineering in which he prepared more than 60 technical articles. He teaches courses to undergraduate and graduate students in naval engineering and ocean engineering at Stevens and served as principal advisor to 8 PhD dissertations and more than 50 master's and undergraduate theses and design projects. He received his Ph.D. in Ocean Engineering from Stevens Institute of Technology. He is a Fellow of the Society of Naval Architects and Marine Engineers (SNAME) and the Royal Institution of Naval Architects (RINA).

About IIT KGP

Kharagpur is the fifth largest city of West Bengal. It was chosen as the location for the first campus of the Indian Institute of Technology (IIT). The IITs are the premier technical education institutes in India and are internationally recognized for their academic and technical excellence. IIT Kharagpur started in the old Hijli Detention Camp where some of India's great freedom fighters toiled and sacrificed their lives for Indian independence. The history of IIT Kharagpur is intimately linked with the history of the Hijli Detention Camp. This is possibly one of the very few Institutions anywhere in the world which started life in a prison house. IIT Kharagpur is celebrating its platinum jubilee from 18th August 2025 to 18th August 2027 .

About the Department

The Department of Ocean Engineering & Naval Architecture was established in 1952. During more than 74 years of its existence, the department has made significant contributions to the development of shipbuilding and shipping industries in the country including the Indian Navy, Indian Coast Guard, DRDO and other allied organizations.

Registration

Category	Fees (**including GST)
Student (IIT Kharagpur)	INR 500
Student (Outside)	INR 2,500
Industry Professional	INR 25,000
Academic Professional	INR 10,000

For Further Details Please Contact

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Certificate

Certificate will be awarded to the participants on successful completion of the course.