

Short-Term Course

on

Ship Theory and CFD Applications

Dates: 08th ~ 11th December, 2025

Venue: PC Lab IV, Ground Floor, Takshashila Building, Srinivasa Ramanujam Complex
IIT Kharagpur, Kharagpur 721 302, West Bengal India

This course addresses the basic ship theory, namely, ship resistance, propulsion, manoeuvring and seakeeping, with specific sessions on CFD applications to Naval Architecture problems.

Lecture Schedule:

Day	Date	Time	Topic
1	08 th December 2025	0930 – 1300†	Ship Resistance (Prof. KL Vasudev), Classification of resistance, available methods and general practices to estimate resistance of ships
		1400 – 1700†	Powering of ships (Prof. Anirban Bhattacharyya) Introduction to Ship Propulsion, Screw Propeller Geometry, Open water characteristics, Hull-propeller interaction, Demonstration of model tests in the towing tank.
2	09 th December 2025	0930 – 1300†	Manoeuvring of marine vehicles (Prof. N. Vishwanath) Introduction; The Control Loop and Basic Equations of Motion; Motion Stability and Linear Equations; Analysis of Course keeping and Controls-Fixed Stability; Stability and Control; Analysis of Turning Ability; Free-Running Model Tests and Hydraulic Models; Nonlinear Equations of Motion and Captive Model Tests
		1400 – 1700†	Seakeeping of marine vessels (Prof Ranadev Dutta) Ship motions in regular waves: Encounter Frequency. Uncoupled/coupled motions, Concept of RAO and phase. Ship motion in irregular waves: wave and encounter spectrum. Derived motions in irregular waves, Discussion on basic seakeeping criteria.
3	10 th December 2025	0930 – 1300†	Handson session on CFD software Shipflow (Dr Michal Orych, Flowtech, Sweden) Getting started, tutorial modules (XPAN, XFLOW, SELFPROPULSION) on resistance and powering of ships
		1400 – 1700†	Handson session on CFD software Shipflow (Dr Michal Orych, Flowtech, Sweden) Captive tests, manoeuvres, estimation of hydrodynamic derivatives using SHIPFLOW
4	11 th December 2025	0930 – 1300†	Handson session on CFD software Shipflow (Dr Michal Orych, Flowtech, Sweden) Seakeeping of marine vehicles using SHIPFLOW
		1400 – 1500†	Discussions, feedback and examination (Prof. KL Vasudev)

†Lectures will be of 1 hour duration with 15 min break.

Faculty: Dr Michal Orych, Managing Director, Flowtech International
and Prof. Vishwanath Nagarajan, Prof. Ranadev Dutta, Prof. Anirban Bhattacharyya and Prof. Kondeti Lakshmi Vasudev, IIT Kharagpur

