MARINE PROPULSION

PROF. ANIRBAN BHATTACHARYYA
Department of Ocean Engineering and Naval Architecture
IIT Kharagpur

PRE-REQUISITES : Knowledge of Hydrodynamics, Basic Ship Theory and Ship Resistance.

INTENDED AUDIENCE : Students pursuing B-Tech/ M-Tech degrees in Naval Architecture, research scholars, and working professionals in the maritime industry.

INDUSTRY SUPPORT : Shipbuilding industry, Naval Architecture firms

COURSE OUTLINE :

The course covers different aspects of marine propellers and propulsion starting with the basic concepts of screw propeller geometry, theories of propeller action, hydrodynamics in open water and behind-hull conditions and practical calculations of ship powering from model test results. Other topics include propeller cavitation, blade strength, and engine-propeller matching. Some propeller design methods and concepts will be discussed. To give a general overview of the propulsors used in marine vessels, controllable-pitch propellers, ducted propellers, podded propellers, and unconventional propulsion devices like waterjets, oscillating propulsors etc. will be included along with thrust augmentation devices for improving energy efficiency. The course should provide a general understanding of marine propulsion for both graduate students and professionals working in the maritime industry.

ABOUT INSTRUCTOR :

Prof. Anirban Bhattacharyya is an Assistant Professor in the Department of Ocean Engineering and Naval Architecture at Indian Institute of Technology Kharagpur. He received the PhD degree in marine technology from the Norwegian University of Science and Technology. Presently, he is involved in research activities related to marine hydrodynamics, design, ship propulsion, and wave energy.

COURSE PLAN :

Week 1: Introduction, Screw Propeller Geometry, Momentum Theory
Week 2: Blade Element Theory, Circulation Theory, Other Models for Propeller Action
Week 3: Laws of Similarity, Dimensional Analysis, Open Water characteristics, Methodical Series
Week 4: Hull-Propeller Interaction, Propulsive Coefficients, Efficiency, Engine-Propeller Matching
Week 5: Propulsion Model Tests, Scale Effects, Powering Performance Extrapolation, Propeller Cavitation
Week 6: Propeller Materials, Blade Strength, Propeller Design
Week 7: Controllable Pitch Propellers, Ducted Propellers, Surface Piercing Propellers, Podded Propellers, Thrusters
Week 8: Unconventional Propulsion Devices, Thrust Augmentation Devices.