FSD3723 Seakeeping and Marine Dynamics 7.5 credits

Sjöegenskaper och marindynamik

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

The syllabus is valid from VT 2025 according to the faculty board decision: S-2024-0066. Decision date: 2024-05-13.

Grading scale

P, F

Education cycle

Third cycle

Specific prerequisites

Basic courses in mechanics, fluid mechanics, numerical methods and statistics.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

This course provides the opportunity to apply and deepen knowledge in mechanics, fluid mechanics, statistics and mathematics, when modelling and evaluating the seakeeping

---

characteristics of ships and the risks and impact on the people aboard. The objective is that students after completing the course, are able to:

1. investigate, evaluate and interpret a ship's roll and stability characteristics, as well as its operability with respect to seakeeping;

2. model water waves and sea states;

3. model ship motions in waves;

4. carry out in-depth analysis of selected mechanical, hydrodynamic and mathematical components of today's prediction methods for ship movements in a seaway;

5. independently carry out seakeeping analysis including selection and application of assessment criteria with respect to the crew's, the ship's and the system's safety;

6. characterize the stochastic processes for ship responses in waves and interpret the responses with respect to safety standards;

7. committed and inclusively contribute to teamwork and group discussions;

8. clearly present and discuss engineering conclusions and the underlying knowledge and arguments, orally and in writing;

9. discuss safety, performance, economic and environmental aspects linked to seakeeping and manoeuvrability.

Course contents

The course is built around a number of assignments supported by lectures, seminars, and experiments aboard ships and includes: Analytical and numerical analysis of ship motions. Hydromechanic and probabilistic modelling of water waves. Modelling details linked to the equation of motion, the wave description and evaluation criteria. Ship operability analysis with respect to seakeeping and seaworthiness. Ship motion investigations in the time domain as well as in the frequency domain where the linear responses are calculated by means of the ship's transfer function and the sea state expressed as a wave spectrum. Characterization of stochastic processes (waves and ship response) in terms of statistical measures and extreme values. Full-scale experiment for investigating a ships roll characteristics and manoeuvrability.

Examination

• PRO1 - Project work, 7.5 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

The examination component consists of several project tasks that are carried out during the course. Tasks are reported both in writing and orally according to templates for scientific reports.

PRO1 - Project work, 7.5 credits, grading scale: P, F

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.

Additional regulations

SD2723 Marine hydromechanics 7.5 credits, overlapping. The PhD students will be offered the same lessons, labs and guest lectures as the master's students in SD2723. It also means cooperation and collaboration with students in SD2723. Some of the doctoral students' tasks are elaborations of tasks in SD2723.