Course title	Code No.
Marine Engineering and Environmental Protection	

Semester	Course status (mandatory or optional)
3.rd	mandatory

Lecturer(s)	E-Mail
Prof. Dr.-Ing. Rom Rabe	**rom.rabe@hs-flensburg.de**

Contact hours per week	Credit Points	Workload		
4	6		Presence	Self-study
		Lecture	30	60
		Seminar		
		Practice		
		Laboratory		
		Simulator	30	60

Media	Teaching aids
Overhead projector, white board, engine room and nautical simulators	Presentations, check lists, work groups, manuals, videos

Enrolment requirements and entry competences required for the course

Successfully completed “Ship energy efficiency and optimization” - course (1. Semester)

Conditions for permission to take the exam

Completed simulator-exercises and written seminar

Assessment methods and criteria

Seminar 30%
Oral or written exam 70%

Learning outcomes at the programme level to which the course contributes

Students should be

1. Able to make informed and responsible decisions regarding environmental protection.

2. Able to understand and apply state of the art ship technology which can influence the development of a shipping company.
3. Able to make informed decisions in management and selection of human resources.
4. Able to understand the ship energy systems and to optimize the ship propulsion operations.

Learning Outcomes

Professional competence	Key skills
The students have the ability to • understand the main and auxiliary engines of ships as much as all systems, auxiliary machinery and systems for Exhaust gas- and Water-Cleaning on board; • determine, asses and rectify errors in the engines and machinery and environmental-relevant systems • understand and assess complex processes and their effects on the ships and the environment • exercise clear communication and documentation on board and with and for the authorities	The students have the ability to • understand and assess complex processes and their effects on the ship; • apply interdisciplinary knowledge and competency; • validate and asses indicators and to initiate appropriate action • communicate in English language professionally correct and handle complex problems in a team and demonstrate leading capacity

Applicability in other courses/programs

This module is suitable for study programs in technical universities dealing with marine engineering environmental protection

Content

Energy-saving Methods in engine room (theoretical and at ship engine room simulator)

- Propulsion plant element (propeller, engine, hybrid…) selection (theoretical)
- thermal and electrical power distribution for different scenarios – various in detail measurements, handlings, switch over – processes….
- Managing technical systems (Decision for different ways of Fresh water production (Osmosis or evaporating), AC / cooling (compressor or absorption plant), Exhaust gas energy (turbine or boiler)…. For different Types of a) propulsion (LNG…) and b) vessels (passenger, container…)
- Selection of suitable Measures to meet different environmental requirements

Environmental Protection (lectures and system-demonstration in SES)

- Regulations (MARPOL I, IV, V, VI, BWC)
- Fuels (conventional, gaseous, alternative Fuels)
- Miller-Cycle, Exhaust-Gas-Recirculation
- Exhaust Gas After Treatment (DeSOx; DeNOx, Particle Filters)
- Ballast Water Convention (D2 – Systems)

Literature

- Handbook “Marine Engineering”
- Technical specifications and Manuals
- IMO Training Course on Energy Efficient Operation of Ships
- ABS: Ship Energy Efficiency Measures
- S.S. Rao: Engineering Optimization: Theory and Practice; John Wiley & Sons, Inc., 1996
- A. Ravindran; K.M. Ragsdell; G.V. Reklaitis: Engineering optimization, Methods and Application; ; John Wiley & Sons, Inc., 2006
- Chapra, S.S.; Canale, R.P.: Numerical methods for engineers
- International Maritime Organisation, Marine Environment Protection Committee, 2012 Guidelines for the Development of a Ship Energy Efficiency Management Plan (SEEMP), MEPC.213(63)
- Lloyd's Register: Implementing a Ship Energy Efficiency Management Plan
- (SEEMP) Guidance for shipowners and operators
- Simulator manuals

Amendment Log

Version No.:	Date:	Changes:	Name:
1.	01.03.2020		Rabe