Liverpool John Moores University

Title:	MARINE ENGINEERING SYSTEMS
Status:	Definitive
Code:	**5021MAR** (105593)
Version Start Date:	01-08-2016
Owning School/Faculty:	Maritime and Mechanical Engineering
Teaching School/Faculty:	Maritime and Mechanical Engineering

Team	Leader
Geraint Phylip-Jones	Y

Academic Level:	FHEQ5	**Credit Value:**	12	**Total Delivered Hours:**	44
Total Learning Hours:	120	**Private Study:**	76		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	30
Tutorial	12

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	70	2
Essay	AS2	Report 2000 words	30	

Aims

To develop advanced understanding of the design and operating principles of marine power plants, the function of a vessel's auxiliary machinery and the application of control systems to be found in the marine environment, on board ships.

Learning Outcomes

After completing the module the student should be able to:

1 Synthesise the design and operating principles of marine power plants.
2 Apply machinery design principles to a merchant vessel's auxiliary machinery.
3 Use control engineering principles in technical appraisal of control systems onboard ships.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

EXAM	1	2	3
CW	1	2	3

Outline Syllabus

Marine Power Plants
Diesel plant:
Diesel propulsion and associated systems; Critical aspects and operational limitations of diesel engine operations. Power and efficiency calculations.
Steam turbine plant:
The layout of steam turbine and associated plant; Critical aspects and operational limitations of boiler and turbine operations. Power and efficiency calculations.

Gas turbine plant:
The layout of gas turbine and associated plant; Critical aspects and operational limitations of gas turbine operations. Power and efficiency calculations.

Auxiliary Machinery
• The transmission of power to the propulsion system. Power and efficiency calculations.
• The design, function and operational principles and limitations of the following, and have awareness of the relevant regulations:
Auxiliary boilers, distillation and freshwater systems, pumps, refrigeration and air conditioning systems, ventilation, sewage treatment plant, oily water separation and oil filtering, incinerators, electrical power generation and distribution, and stabilisers. Power and efficiency calculations, where applicable.
• Steering and manoeuvring systems:
Ram and rotary systems, telemotor and transmission system, auxiliary and emergency steering systems, thrusters, relevant regulations. Rudder and propeller design properties. Power and efficiency calculations, where applicable

Control Systems
• Marine engineering terms: Terms in common use consistent with use in UK regulations.
• The principles of control systems design: Open and closed loops and their components; types of control action; practical shipboard applications. Application of fundamental mathematical relationships (formulae) in control systems design.

• The need for function and operation of: Data loggers; mimic diagrams; analogue and digital displays; shipboard applications of the above.
• Bridge control: Principles of bridge control, including fail safe, fail run and safety interlocks for: Slow speed diesel engines; medium speed diesel engines fitted with controllable pitch propeller or reversing gearbox; steam turbines with associated boilers; gas turbines; thruster systems; interchanging bridge and engine-room control; requirements for plant monitoring and alarm systems for UMS Operations; and integrated bridge systems.
Factors affecting fuel consumption: Fuel consumption calculations; conservation of fuel; propeller behaviour analysis (pitch and slip); and ship hull form and conditions.

Learning Activities

Formal lectures enhanced by the use of videotaped material, models and computer simulation. Carry out a design project as part of the course in order to stimulate students' understanding of the principles of system design processes. daytime attendance.

Notes

This module intends to provide an advanced understanding of marine engineering systems in terms of fundamentals of design and operation of marine power plants, auxiliary machinery and the application of control systems in ships. This module provides the underpinning knowledge as described in MN10 of the library of underpinning knowledge for Merchant Navy Deck Personnel. The contents exceed the content of the international Standards of Training Certification and Watchkeeping (STCW) as amended in 1995.