

FU	FREDERICK UNIVERSITY		MAR514/1
	Course Outline		
Course Code:	MAR514		
Course Title:	Marine power (Motor)		
Level:	Postgraduate career-based course		
Credits:	6 ECTS		
Department:	Maritime Transport and Commerce / Mechanical Engineering		
Pre-requisites:	BSc or BEng Mechanical Engineering (or appropriate equivalent)		
Introduction and Rationale:			
<p>Modern merchant vessels are complex engineering structures dependent for their operation on a wide variety of mechanical, electrical and electronic systems. Good knowledge and in depth understanding of these systems therefore constitutes a major part of the marine engineering curriculum. Most of these systems are common to many types of vessels although the degree of importance and engineering complexity might vary from case to case and is subject to engineering development and progress.</p>			
Aim:			
<p>The aim of the course is to provide the fundamental engineering knowledge of common traditional marine engineering systems while introducing technology evolution as appropriate for each case, to meet the requirements of the International Maritime Organisation (IMO) Standards of Training and Certification of Watchkeepers (STCW) for Engineering Officer of the Watch (EOOW) at operational level.</p>			
Learning Outcomes:			
Motor section			
Note: this section is only for candidates taking the EOOW (motor) Licence			
<p>On completion of this course the student will know:</p> <ul style="list-style-type: none"> • Watchkeeping requirements on main propulsion and auxiliary engines. Safe preparation and shutdown of main propulsion and auxiliary engines. Starting, stopping and control of main propulsion and auxiliary engines. Procedures for emergency situations. • Describe watchkeeping activities required to maintain operation of main propulsion and auxiliary machinery and associated systems (fuel, lubrication, cooling, air, starting). State the procedures for accepting and handing over a watch and requirements for UMS operations. • Describe the basic refinery processes used in the production of marine fuel and lubricating oils • Know the contents of ISO8217, Marine fuels. Describe the physical properties and contaminations and how they may affect the running of main and auxiliary engines. • Identify and explain the function of the constructional components and running gear of diesel engines and turbochargers, describing the routine maintenance required. • Describe the operating principles of two and four stroke diesel engines including 			

timing diagrams and indicator cards.

- Describe the operating principles and explain the purpose of turbochargers.
- Describe the operating principles and maintenance of main reduction gearboxes.
- Describe the operating principles and maintenance of transmission system clutches.
- Describe the preparation of propulsion and auxiliary machinery from cold to ready for manoeuvring and shutdown to normal port conditions, explain the reasons for correct warming and cooling down.
- Explain starting and reversing of diesel engines and describe the requirements to operate from local, engine side control.
- Identify faults and explain the remedial actions required when given observations and symptoms of main propulsion plant, auxiliary machinery and associated systems. (Fuel, lubrication, cooling, air, starting)
- Explain the importance of maintaining correct parameters, levels, clearances, lubricating oil condition. Describe the control of temperatures, pressures, viscosity associated with main propulsion and auxiliary machinery
- Explain the causes and dangers arising from scavenge fires, crankcase oil mist, economiser fires, describing their prevention. State how they are detected and the procedure to be taken should they occur.
- Sketch ancillary systems required for operation of main propulsion and auxiliary machinery; cooling water, lubricating oil, high pressure fuel, starting air, fuel oil storage and preparation, identifying the major components and describing the maintenance required.
- Operation, control, protection and maintenance of starting air compressors and storage. Describe the manual and automatic operation of starting air compressors. State, and explain the need for, the protection devices fitted.
- Explain the difference between main and auxiliary boilers.
- Explain the difference between fire tube and water tube boilers.
- Describe where steam may be used on-board a vessel
- Operation, control, protection and maintenance of an auxiliary boiler and feed system.
- Identify the fittings of auxiliary boilers and explain their purpose. Describe the testing of level gauges, alarms and safety valves.
- Describe and explain the warming procedure for an auxiliary boiler.
- State the operating sequence of an automatic burner unit of an auxiliary boiler, explain the need for purging and state the checks and precautions required.
- Describe the feed system for an auxiliary boiler; explain the need for, and describe, boiler water tests. Explain the consequences of boiler water contamination.

Learning Outcomes:

Steam section

Note: this section is only for candidates taking the EOOW (steam) Licence

On completion of this course the student will know:

- Watchkeeping requirements on boilers, turbines, condensate systems and auxiliary engines. Safe preparation and shutdown of boilers and turbines and condensate system.
- Starting, stopping and control of main propulsion and auxiliary turbines. Procedures for emergency situations.
- Describe watchkeeping activities required to maintain operation of main propulsion and boilers, auxiliary machinery and associated systems (fuel, lubrication, condensate, cooling, heating). State the procedures for accepting and handing over a watch and requirements for UMS operations.
- Describe the basic refinery processes used in the production of marine fuel and

<p>lubricating oils</p> <ul style="list-style-type: none"> • Know the contents of ISO8217, Marine fuels. Describe the physical properties and contaminations and how they may affect the running of main and auxiliary engines. • Operation and construction of boilers, turbines and gearing. • Identification of faults and understand the remedial action required on boilers, turbines and condensate systems. • Operation of ancillary systems for boilers, main propulsion and auxiliary machinery. Operation, control, protection and maintenance of auxiliary engines. • Explain the importance of maintaining correct parameters, levels, clearances, lubricating oil condition. • Describe the preparation of propulsion and auxiliary machinery from cold to ready for manoeuvring and shutdown to normal port conditions, explain the reasons for correct warming and cooling down. • Explain starting and reversing of turbines and describe the requirements to operate from local control including testing and operation of emergency trips. • Describe the control of temperatures, pressures, levels associated with main propulsion, boilers and auxiliary machinery. • Identify faults and explain the actions required when given observations and symptoms of main propulsion plant, auxiliary machinery and associated systems. (Fuel, lubrication, cooling, condensate, heating) • Sketch ancillary systems required for operation of main propulsion and auxiliary machinery; cooling water, lubricating oil, condensate, fuel oil storage and preparation, heating, identifying the major components and describing the maintenance required. • Describe the construction of boilers, main turbines and condensers. • Describe transmission gearing arrangements, explaining their purpose and faults that may occur. • Describe the operation and maintenance of auxiliary engines, identify faults and explain the need for safety devices. • Describe and explain the warming procedure for a main boiler, stating the requirements for coupling boilers. • Describe the maintenance of main boilers, testing of alarms and safety devices. • Explain the need for, and describe, boiler water tests. Explain the consequences of boiler water contamination. • State the operating sequence of an automatic burner unit of a main boiler, explain the need for purging and state the checks and precautions required. • Operation and maintenance of the condensate and feed system. Describe the component parts of a condensate and feed system for a main boiler and turbine plant.
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Main Learning and Teaching Activities:

Lectures will provide a conceptual framework of all key areas. Students will work individually and/or in groups for their assignments. Computer based learning packages, simulation, Universities resources and industrial visits will support familiarisation with the various types of marine equipment where applicable. Guest lecturers from industry will supplement practical input and experience whenever possible.

Assessment Details:		
Method of assessment	Weighting %	Outline detail
Coursework	40%	1 individual assignment (part 1 and 2)
Examination	60%	Closed book 3 hour written exam