

<b>Course title</b>	Monitoring and operation of shipboard electrical systems and machinery			
<b>STCW Code alignment ref.</b>	<b>Table A-III/7</b> <i>Specification of minimum standard of competence for electro-technical rating</i>			
<b>Function</b>	Marine Engineering at the support level			
<b>Course code</b>			<b>Lecture</b>	
<b>Course version</b>	V1		<b>Tutorial</b>	
<b>Level</b>	4	<b>Directed learning hours</b>	<b>Blended</b>	75
<b>Credits</b>	10		<b>Practical</b>	
<b>Delivery mode</b>	Blended		<b>Workshop</b>	
<b>Internet Based Learning Indicator</b>	3	<b>Work integrated learning hours</b>		
<b>EFTS value</b>	.0833	<b>Independent learning hours</b>		25
<b>Pre-requisites</b>		<b>Notional learning hours</b>		100
<b>Co-requisites</b>				
<b>Attendance requirements</b>	80% attendance is recommended for course work;			

## Aim

Demonstrate knowledge and skills to monitor electrical systems and machinery on board

## Learning outcomes

On successful completion of this course the student will be able to:

### Outcome 1 **Demonstrate basic knowledge of the operation of mechanical engineering machinery systems on board**

- explains the operating principles of prime movers, including main propulsion plant
- describes the range of and operation of engine room auxiliary machineries
  - air compressors
  - auxiliary boilers; steering gear; fuel oil, cooling and lubricating oil systems
  - fuel temperature and viscosity control
  - boiler
  - FO and LO purifiers
  - cargo refrigeration plant
  - air conditioning plant
- explains the operation of typical ship steering systems at a basic level
- describes the operation of typical cargo handling systems at a basic level
- describes the operation of common ship deck machineries at a basic level

- describes the range and operation of typical hotel systems at a basic level

## Outcome 2 **Demonstrate basic knowledge of the operation of electro technical systems on board**

Explains basic electro-technology and electrical machine theory

- provides definitions of: current, voltage resistance, capacitance, inductance,
- electrical power and energy
  - names and converts units for respective quantities
  - DC circuit laws: states Ohm's law and calculates resistance of resistors connected in series and in parallel
- AC circuits and related principles
  - explains differences between AC and DC
  - defines r.m.s. value of alternate current
- magnetic and electromagnetic induction
  - describes the influence of magnetic field on conductor carrying current
  - uses Fleming's rule to determine the directions of magnetic field, motion and current
  - states Faraday's law
  - states Lenz's law
  - describes principles of self and mutual induction as well as self and mutually induced e.m.f
  - compares coil inductance with and without iron core
- fundamentals of electrical machines
  - defines the term "electrical machine" and provides the classification of electrical machines
  - describes the typical structures of various machines and used materials
- principles of transformers
  - describes structures and operating principles of single and three-phase transformers
- principles of asynchronous machines
  - describes structures and operating principles of asynchronous machines
  - for a given frequency and motor structure calculates synchronous speed and explains the term of slip
  - describes methods of AC motors start-up and speed control
  - given a motor name plate, explains the meaning of all the information displayed
- describes at a basic schematic level, the operation of electrical power distribution boards and electrical equipment
- describes the fundamentals of automation, automatic control systems and technology
- explains the operation of instrumentation, alarm and monitoring systems
- explains the operation of electrical drives
- explains the operation of electro-hydraulic and electro-pneumatic control systems
- describes, at a basic level, coupling, load sharing and changes in electrical configuration

## Assessment

Number	Type	Weighting	Learning Outcomes assessed
1	Assignment workshop based	C	1-2
2	Written test	C	1-2

## Resources required

Text books

Hall, Dennis T, 1996 Second Edition, Practical Marine Electrical Knowledge  
ISBN 1 85609 1821

Hall, Dennis T, 2014 Third Edition, Practical Marine Electrical Knowledge  
ISBN 978 1 85609 623 2

Schaum Theory and Problems of Basic Electricity  
ISBN 0 03 025240 8

Videotel training video series

Practical Marine Electrical Knowledge (1) - Ships Electrical Systems - Safety and Maintenance

Practical Marine Electrical Knowledge (2) - Electrical Distribution

Laboratory

Electrical and Electronics laboratory – test instruments

