|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course title** | Monitoring and operation of shipboard electrical systems and machinery | | | | |
| **STCW Code alignment ref.** | **Table A-III/7** Specification of minimum standard of competence for electro-technical rating | |  | | |
| **Function** | Marine Engineering at the support level | | | | |
| **Course code** |  | **Directed learning hours** | | **Lecture** |  |
| **Course version** | V1 | **Tutorial** |  |
| **Level** | 4 | **Blended** | 75 |
| **Credits** | 10 | **Practical** |  |
| **Delivery mode** | Blended | **Workshop** |  |
| **Internet Based Learning Indicator** | 3 | **Work integrated learning hours** | | |  |
| **EFTS value** | .0833 | **Independent learning hours** | | | 25 |
| **Pre-requisites** |  | **Notional learning hours** | | | **100** |
| **Co-requisites** |  | | | | |
| **Attendance requirements** | 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](mms://W2K8MEDIA.maritime.manukau.ac.nz/Ships%20Electrical%20Systems%20-%20Safety%20and%20Maintenance)

[Practical Marine Electrical Knowledge (2) - Electrical Distribution](mms://W2K8MEDIA.maritime.manukau.ac.nz/Electrical%20Distribution)

Laboratory

Electrical and Electronics laboratory – test instruments