Course title	**Maintenance & repair of automation and control systems of main propulsion and auxiliary systems year 2. 942.580**		
All year one curse	Function	Table A-III/6: Function Maintenance and repair at the operational level	
	Competence	1/3rd of: *Maintenance and repair of automation and control systems of main propulsion and auxiliary machinery*	
Course code	U	**Lecture**	
Course version	V1	**Tutorial**	
Level	5	**Directed learning hours** **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	All year one courses	**Notional learning hours**	**100**
Co-requisites			
Attendance requirements	Minimum 80% attendance is recommended		

Aim

On successful completion of this course the student will be able to demonstrate knowledge of automation and control systems of main propulsion and auxiliary systems to maintain and repair automation systems

Learning outcomes

Demonstrate knowledge of automation and control systems of main propulsion and auxiliary systems

Content

Outcome 1 **Demonstrate knowledge of automation and control systems of main propulsion and auxiliary systems**

demonstrates knowledge of:

- maintenance procedures and repair of electrical, mechanical, pneumatic, hydraulic components and automation equipment of main propulsion and auxiliary machinery
  Main engine wiring diagrams. Generator wiring diagrams.

- maintenance and repair of PID controllers
  Write PLC programs for PID

- maintenance and repair of actuators

- principle of controller optimal settings according to the Ziegler- Nichols rule and manual adjustment of controller according to observed control errors
  PID settings and tuning

- principles of maintenance and repair of propulsion remote control systems on the example of arbitrarily chosen standard, for example "Denis"
  Wartsila DENIS-R, Rexroth XXX, http://www.pmc-controls.com, ???

- maintenance procedures and repair of main propulsion with specific reference to:
  - power supply
  - cabling and grounding
  - switchboards, terminal strips, connectors and cards replacement
  - indication lamps
  - ventilation, heat, ambient condition
  - RPM and pitch indication
  - overload indication
  - UMS engineer alarm system clutch remote control
  - RPM remote control
  - pitch remote control
  - back up control
  - alarms and control set points
  - outputs and inputs PLC
  - emergency stop and start
  - shutdown and slowdown
  - broken wire alarm
  - systems of reversing propeller shaft
  - tacho-generator
- maintenance procedures and repair of fuel temperature and viscosity automatic control system

- maintenance procedures and repair of compressed air automatic control system
  Compressed air control levers for main engines.

- maintenance procedures and repair of lubrication, fuel and cooling automatic control systems
  Lubrication control systems.
  Fuel control systems.
  Cooling control systems.

- maintenance procedures and repair of variable pitch propeller control system
  Follow-up systems

- maintenance procedures and repair of steam production automatic control system

- maintenance procedures and repair of ship refrigeration plants control systems: provision, refrigerated cargo holds and containers, air condition

- maintenance procedures and repair of the following engine auxiliary control systems: oil and fuel separators, sewage treatment plant, evaporator and osmotic fresh water generators, incinerators

- maintenance procedures and repair of steering gear control system
  Hydraulic steering valves

Assessment

Number	Type	Weighting	Learning Outcomes assessed
1	Assignment in simulator environment including a written report	C	1
2	Practical simulator environment	C	1

Resources required

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/DVD series
Electrical and Electronics laboratory – NZ Maritime School
Electrical Machines laboratory-MIT South Campus
Engine Room simulator
Engine Room MIT South Campus NI building