Response to DIPAE's Evaluation Report for the BSc Marine Electro Technology Programme

September 2016

14th September 2016,

Members of the Programme Evaluation Committee of DIPAE

Re : Response to the Evaluation Report of the BSc Marine Electro-Technology Programme

Dear Members of the Programme Evaluation Committee of DIPAE,

I would like to extend my gratitude for the productive meeting and constructive discussions that incurred during your visit on 7th & 8th September 2016, as well as for your feedback and suggestions that were received through your report dated 9th September 2016.

Following your suggestions and recommendations, we have made a number of changes that aim to further improve the programme.

More specifically:

1. The level of the Mathematics courses has been increased to reflect the level required of a Bachelor Degree programme. Extra content has also been added as well as an increase in the teaching periods per week for the MAET- 104 hours (the hours have been doubled).

2. The course 'Basic Engineering Science' has been renamed 'MAET-102, Physics' and additional material has been added to the syllabus as well as an increase in the teaching periods per week in order to reflect the additional content. Additions have been made with reference to the Committee's suggestions, namely adding the topics of Electricity and Magnetism.

3. We have increased the number of teaching hours to 75 as suggested for the course MAET-121 Electrical Drawing to provide enough time to cover CAD etc.

4. The on board practical training has been modified already and the cadets will have to undertake practical training on the Ship at the end of the second semester during the Summer for 2 months while keeping the other two periods as planned. This modification was suggested by industry and more specifically the members of the Board of Governors. Based on this all cadets are guaranteed a placement on board a ship.

Additionally, following the suggestions of the Committee regarding research, Intercollege has established an agreement with MARINEM (a company specializing in Naval Research), where students and faculty will have the opportunity to undertake research topics and actual hands on experience in Naval research projects.

The updated programme pathway is shown in Appendix A and the corresponding semester breakdown in Appendix B. Appendix C contains the course descriptions that have been amended to represent the Committees suggestions. Finally in Appendix D are the projects reflecting Marinem's activities.

Regarding the Committee's comments on the Entry Criteria and that due to the nature of the programme that students should be proficient swimmers, we have adopted this suggestion and it will be a requirement for all prospective students.

We are confident that the improvements that have been made to the programme, especially with regard to the curriculum, will result in a competitive academic programme. We always welcome suggestions for further improvement, especially after the programme runs for a full cycle and delivers its first graduates.

I am looking forward to your positive response on the approval of the BSc in Marine Electro Technology. Your prompt response will be greatly appreciated as we are eager to run the programme for the forthcoming semester.

Yours sincerely,

Dr. Stylianos Mavromoustakos
Executive Director

APPENDIX A

Programme Pathway

Marine Electro-technology (4 year Bachelor of Science)				
A/A	**Course Code**	**Course Title**	**Hours**	**ECTS Credits**
1.	**MAET-101**	Mathematics I	4	5
2.	**MAET-102**	Physics	5	6
3.	**MAET-103**	Industrial Chemistry	3	4
4.	**MAET-111**	Informatics	2	3
5.	**MAET-112**	Basic Electro-technology	4	5
6.	**MAET-113**	Main Marine Machinery Systems	2	3
7.	**MAET-114**	Auxiliary Machinery of Ships I	3	4
8.	**MAET-104**	Mathematics II	4	5
9.	**MAET-105**	Thermodynamics	3	4
10.	**MAET-106**	Mechanical Science	4	5
11.	**MAET-115**	Analogue Electronics	3	6
12.	**MAET-116**	Electric Machines	4	6
13.	**MAET-121**	Electrical Drawing	5	4
14.	**MAET-201**	Heat Transfer	2	3
15.	**MAET-211**	Control Systems	3	4
16.	**MAET-212**	Sensors	4	5
17.	**MAET-214**	Electric Power Systems	5	7
18.	**MAET-215**	Power Electronics	2	3
19.	**MAET-216**	Electrical Drivers	2	3
20.	**MAET-217**	Digital Systems	4	5
21.	**MAET-311**	Electro Hydraulic – Electro Pneumatic Systems	2	4
22.	**MAET-312**	High Voltage Systems	4	5
23.	**MAET-314**	Auxiliary Machinery of Ships II	3	5
24.	**MAET-321**	Internal – External Communication Systems	2	4
25.	**MAET-322**	Maintenance of Electrical Power Systems	4	6
26.	**MAET-323**	Fault Detection Methods	4	6
27.	**MAET-313**	Electric Propulsion	2	4
28.	**MAET-315**	Operation of Ship	3	6
29.	**MAET-316**	Computer Networks	2	4

30.	**ESP-317M**	Technical Maritime English	2	4
31.	**MAET-324**	Electric Systems of Main Propulsion – Auxiliary Machinery	2	6
32.	**MAET-325**	Electric Systems of Deck Machinery – Cargo Handling Equipment	3	6
33.	**MAET-411**	Construction of Bridge and Engine Room	4	6
34.	**MAET-421**	Bridge Navigation Equipment	3	4
35.	**MAET-422**	Electric Systems of Hotel Equipment	2	4
36.	**MAET-431**	Leadership and Teamwork	2	3
37.	**MAET-432**	International Maritime Conventions	2	3
38.	**MAET-490**	Bachelor Thesis	--	10

Total Credits	180
On Board	60
Total	240

APPENDIX B

Semester Breakdown

Semester Breakdown

A/A	Course Type	Course Name	Course Code	Periods per week	Period duration	Number of weeks/ Academic semester	Total periods/ Academic semester	Number of ECTS
Semester A								
1.	Required	Mathematics I	MAET-101	4	50 min.	15	60	5
2.	Required	Physics	MAET-102	5	50 min.	15	75	6
3.	Required	Industrial Chemistry	MAET-103	3	50 min.	15	45	4
4.	Required	Informatics	MAET-111	2	50 min.	15	30	3
5.	Required	Basic Electro-technology	MAET-112	4	50 min.	15	60	5
6.	Required	Main Marine Machinery Systems	MAET-113	2	50 min.	15	30	3
7.	Required	Auxiliary Machinery of Ships I	MAET-114	3	50 min.	15	45	4
Semester B								
8.	Required	Mathematics II	MAET-104	4	50 min.	15	60	5
9.	Required	Thermodynamics	MAET-105	3	50 min.	15	45	4
10.	Required	Mechanical Science	MAET-106	4	50 min.	15	60	5
11.	Required	Analogue Electronics	MAET-115	3	50 min.	15	45	6
12.	Required	Electric Machines	MAET-116	4	50 min.	15	60	6

13.	Required	Electrical Drawing	MAET-121	5	50 min.	15	45	4
Semester C								
14.	Required	Heat Transfer	MAET-201	2	50 min.	15	30	3
15.	Required	Control Systems	MAET-211	3	50 min.	15	45	4
16.	Required	Sensors	MAET-212	4	50 min.	15	60	5
17.	Required	Electric Power Systems	MAET-214	5	50 min.	15	75	7
18.	Required	Power Electronics	MAET-215	2	50 min.	15	30	3
19.	Required	Electrical Drivers	MAET-216	2	50 min.	15	30	3
20.	Required	Digital Systems	MAET-217	4	50 min.	15	60	5
Semester D								
SHIP								30
Semester E								
21.	Required	Electro Hydraulic – Electro Pneumatic Systems	MAET-311	2	50 min.	15	30	4
22.	Required	High Voltage Systems	MAET-312	4	50 min.	15	60	5
23.	Required	Auxiliary Machinery of Ships II	MAET-314	3	50 min.	15	45	5
24.	Required	Internal – External Communication Systems	MAET-321	2	50 min.	15	30	4

25.	Required	Maintenance of Electrical Power Systems	MAET-322	4	50 min.	15	60	6
26.	Required	Fault Detection Methods	MAET-323	4	50 min.	15	60	6
Semester F								
27.	Required	Electric Propulsion	MAET-313	2	50 min.	15	30	4
28.	Required	Operation of Ship	MAET-315	3	50 min.	15	45	6
29.	Required	Computer Networks	MAET-316	2	50 min.	15	30	4
30.	Required	Technical Maritime English	ESP-317M	2	50 min.	15	30	4
31.	Required	Electric Systems of Main Propulsion – Auxiliary Machinery	MAET-324	3	50 min.	15	45	6
32.	Required	Electric Systems of Deck Machinery – Cargo Handling Equipment	MAET-325	3	50 min.	15	30	6

Semester G								
SHIP								30
Semester H								
33.	Required	Construction of Bridge and Engine Room	MAET-411	4	50 min.	15	60	6
34.	Required	Bridge Navigation Equipment	MAET-421	3	50 min.	15	45	4
35.	Required	Electric Systems of Hotel Equipment	MAET-422	2	50 min.	15	30	4

36.	Required	Leadership and Teamwork	MAET-431	2	50 min.	15	30	3
37.	Required	International Maritime Conventions	MAET-432	2	50 min.	15	30	3
38.	Required	Bachelor Thesis	MAET-490	----	----	----	----	10

APPENDIX C

Revised Course Syllabi

COURSE DESCRIPTION

Course Title	Mathematics I					
Course Code	MAET-101					
Course Type	Required					
Level	1st Cycle					
Year / Semester	1st Year, Fall Semester					
Teacher's Name	Dr. Marios Alaeddine					
ECTS	5	Theory	Laboratory	Simulation	Tutorial	Seminar
		3	-----	-----	1	----
Course Purpose and Objectives	The main objectives of the course are • basic arithmetical operations; • arithmetical expressions; • basic algebra • linear and quadratics equations and methods of solution • basic statistical methods					
Learning Outcomes	After completion of the course students are expected to be able to: • be proficient in calculations involving the basic arithmetical operations and algebra essentials; • deal with arithmetical expressions involving the use of brackets; • construct graphs of linear and polynomial expressions • solve problems in algebra. • perform basic interpolation of functions					
Prerequisites	None	Required	MAET-102, MAET-112			
Course Content	**1. ALGEBRA** • sums, differences, products and quotients of simple algebraic expressions, including simple fractions • expansion of the square and the cube, the difference of squares and cubes, the summation of cubes • extraction of common factors, simplification of expressions and collection of common terms • solution of problems leading to linear equations, solution of systems of two equations in two unknowns • quadratic equations • 'absolute error' and 'relative error' • percentage errors in areas and volumes **2. GRAPHS** • draws and labels axes • defines 'origin', 'abscissa', 'ordinate', and describes how a point is identified by its Cartesian co-ordinates • determines suitable scales from given data					

	• plots points, given their Cartesian co-ordinates • draws a smooth curve through plotted points • given the abscissa, reads the value of the ordinate and vice versa • extracts values from graphs of ship's data • draws graphs of given functions • solves simultaneous equations graphically **3. PROPORTION , VARIATION AND INTERPOLATION** • defines the ratio of two quantities, and uses the notation a : b = a/b • uses the notation a:b :: c:d and states that it is equivalent to a/b = c/d • given any three quantities of a proportional equation, calculates the fourth • explains that map and drawing scales are expressed as ratios • solves problems involving scales • states that two quantities which vary so as to maintain a constant ratio are said to vary directly • states that a quantity is said to vary inversely as another when it varies directly as the reciprocal of the other • states that a quantity is said to vary jointly as a number of others when it varies directly as their product • solves problems on direct, inverse and joint variation explains what is meant by linear interpolation • shows how linear interpolation is an application of proportion • uses linear interpolation to find intermediate values in tables such as ullage tables and deadweight scales • given intermediate values, performs inverse interpolation to find the value of the argument • uses differences in inverse interpolation • describes the arrangement and use of critical tables • interpolates in tables with two arguments • given the value of one argument, uses inverse interpolation to find the value of the other argument • performs linear extrapolation • explains, with the aid of a diagram, how the linear assumption may lead to error in the interpolated value • states that the intervals of arguments used in navigational tables are sufficiently small that linear interpolation produces negligible errors
Teaching Methodology	Lectures and Assignments

<table>
<tr><td>Bibliography</td><td>

Required Textbooks/Reading:

Authors	Title	Publisher	Year	Library Access
M. Sullivan and M. Sullivan III	Precalculus	Pearson	2017 7th Edition	Print copy at library

Recommended Textbooks/Reading:

Authors	Title	Publisher	Year	Library Access
M. Bittinger, J. Beecher, D. Ellenbogen, J. Penna	Precalculus: Graphs and Models	Pearson	2017 6th Editio n	Print copy at library

</td></tr>
<tr><td>Assessment</td><td>Midterm Exam, Final Exam, Assignments</td></tr>
<tr><td>Language</td><td>English</td></tr>
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COURSE DESCRIPTION

<table>
<tr><td>Course Title</td><td colspan="6">Mathematics II</td></tr>
<tr><td>Course Code</td><td colspan="6">MAET-104</td></tr>
<tr><td>Course Type</td><td colspan="6">Required</td></tr>
<tr><td>Level</td><td colspan="6">2nd Cycle</td></tr>
<tr><td>Year / Semester</td><td colspan="6">1st Year, Spring Semester</td></tr>
<tr><td>Teacher's Name</td><td colspan="6">Dr. Marios Alaeddine</td></tr>
<tr><td>ECTS</td><td rowspan="2">5</td><td>Theory</td><td>Laboratory</td><td>Simulation</td><td>Tutorial</td><td>Seminar</td></tr>
<tr><td>3</td><td>----</td><td>-----</td><td>1</td><td>----</td></tr>
<tr><td>Course Purpose and Objectives</td><td colspan="6">The main objectives of the course are
• trigonometric functions and operations;
• basic geometry</td></tr>
<tr><td>Learning Outcomes</td><td colspan="6">After completion of the course students are expected to be able to:
• be proficient in calculations involving the basic arithmetical operations and algebra essentials;
• deal with arithmetical expressions involving the use of brackets;
• construct graphs of linear and polynomial expressions
• solve problems in algebra.
• perform basic interpolation of functions</td></tr>
<tr><td>Prerequisites</td><td colspan="2">MAET-101</td><td>Required</td><td colspan="3">None</td></tr>
<tr><td>Course Content</td><td colspan="6">1. TRIGONOMETRY
• describes the measurement of angle in degrees, minutes and seconds of arc
• describes the measurement of angle in circular measure and defines the radian
• states that 1 radian is approximately equivalent to 57.3°
• defines sine, cosine and tangent as ratios of the sides of a right-angled triangle
• defines the reciprocal ratios cosecant, secant and cotangent
• states the complementary pairs of ratios
• solves problems reducible to right-angled triangles
• states the values of trigonometrical functions for angles 0°, 30°,45 °, 60°, 90° (using scientific calculators)
• determines the trigonometrical functions for angles of any size
• draws graphs of the trigonometrical functions over the range -360° to 360°
• states the period of the functions sine, cosine and tangent
• uses trigonometrical formula sin2a + cos2a = 1 and sina/cosa = tana in solving simple identities</td></tr>
</table>

- solves problems involving the application of objectives on right angled triangle /oblique plane triangles using the cosine and sine formulae
- explains the ambiguous case when using the sine formula

2. MENSURATION

- revises calculations for the perimeters and areas of:
  - a square
  - a rectangle
  - a parallelogram
  - a trapezium
  - a rhombus
  - a triangle
  - a circle
- calculates the areas of sectors and segments of a circle
- calculates the surface areas and volumes of:
  - a cube
  - a rectangular and a triangular prism
  - a cylinder
  - a right circular cone
  - a sphere
- Length and Angle;
- use of instruments to construct simple figures;
- calculate the perimeter, area and volume of rectangular figures;
- angles of triangle and angles formed by the intersection of lines;

basic algebra and solution of linear and quadratics equations

3. GEOMETRY

- distinguishes, equilateral, isosceles, right-angled and scalene triangles
- defines acute, obtuse and reflex angles
- states the sum of the angles of a plane triangle
- proves the property of exterior angles
- explains what is meant by congruent triangles
- solves problems involving the application of objectives
- describes the properties of similar triangles
- constructs triangles from given data
- explains the ambiguous case, given two sides and a non-included angle
- states Pythagoras's theorem, without proof, and uses it to calculate one side of a right-angled triangle, given the other two
- states the relationships between angles formed by a transversal to two parallel straight lines
- defines an arc, a sector, a chord and a segment of a circle
- determines arc length, given radius and angle of sector
- states that angles subtended by a chord in the same segment of a circle are equal
- states that the angle subtended by a chord at the center of a circle is twice the angle subtended at the circumference
- states that the angle subtended at the circumference by a diameter is a right angle

- defines a quadrilateral, a parallelogram, a trapezium and a rhombus
- calculates areas of sectors and segments of a circle
- explains and applies Simpson's first, second and five-eighth rule for their use in the computation of areas, volumes and centroids (no derivations required)
- constructs:
  - a perpendicular to a line from a given point
  - a perpendicular to a line at a given point on the line
  - a tangent to a circle
  - the perpendicular bisector of a line
  - the bisector of an angle
- divides a line into a given number of equal parts
- determines:
  - the circumcentre of a triangle
  - the in-center of a triangle
- defines a median of a triangle
- defines the centroid of a triangle and determines centroids by construction
- given three points and the angles subtended by pairs of those points at a position, determines the position by plotting

4. SPHERICAL TRIANGLES

- defines a great circle, small circle, pole and a small circle
- defines a spherical triangle as a figure on the surface of a sphere bounded by arcs of three great circles
- defines the angle between two great circles as the angle between the planes in which they lie
- describes how the length of a side is measured as an angle
- states that the sum of the angles of a spherical triangle exceeds 180° but is less than 540°
- states that no side exceeds 180°
- explain right-angled spherical triangles and their properties
- explain Napier's rule for right angled spherical triangles and quadrantal spherical triangles
- explain polar triangles and their application in the solution of spherical triangles
- given two parts of a right-angled spherical triangle, uses Napier's rules to solve for any other part
- states what is meant by a quadrantal triangle 6
- given two parts of a quadrantal triangle, uses Napier's rules to solve for any other part solves problems involving oblique spherical triangles by use of the cosine and sine formulae
- uses the haversine formula to solve right-angled spherical triangle and explains its advantage over the sine and cosine formulae

solves problems on spherical triangles by dropping a perpendicular and solving the resulting right-angled triangle

5. Differential and Integral Calculus

- concept of differentiation and integration and their applications in mathematics and engineering

<table>
<tr><td>Teaching Methodology</td><td>Lectures and Assignments</td></tr>
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<tr><th>Authors</th><th>Title</th><th>Publisher</th><th>Year</th><th>Library Access</th></tr>
<tr><td>H. Anton, I. Bivens, S. Davis III</td><td>Calculus</td><td>Wiley</td><td>2012 10th Edition</td><td>Print copy at library</td></tr>
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<tr><th>Authors</th><th>Title</th><th>Publisher</th><th>Year</th><th>Library Access</th></tr>
<tr><td>M. Bittinger, J. Beecher, D. Ellenbogen, J. Penna</td><td>Precalculus: Graphs and Models</td><td>Pearson</td><td>2017 6th Editio n</td><td>Print copy at library</td></tr>
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</td></tr>
<tr><td>Assessment</td><td>Midterm Exam, Final Exam, Assignments</td></tr>
<tr><td>Language</td><td>English</td></tr>
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COURSE DESCRIPTION

Course Title	Physics					
Course Code	MAET-102					
Course Type	Required					
Level	1st Cycle					
Year / Semester	1st Year, Fall Semester					
Teacher's Name	Dr. Marios Alaeddine					
ECTS	6	Theory	Laboratory	Simulation	Tutorial	Seminar
		4	----	-----	1	----
Course Purpose and Objectives	The main objectives of the course are to: • present the characteristics of physical quantities, dimensions and units; • enhance the problem solving capabilities of attendees; • recognize the parameters which influence velocity, acceleration & momentum; • help students appreciate the relationships between concepts of work, energy & power; • be able to distinguish between dimensions, units and convert units accordingly; • distinguish difference between fluid volume, mass and pressure forces; • apply and relate work, power, velocity changes, volume changes to ship operations. • familiarize students with the oscillatory motion; • introduce concepts of electricity and magnetism					
Learning Outcomes	After completion of the course attended are expected to be able to: • determine the mass of bodies, know the parameters which affect mass density; • appreciate the relationship between weight, mass and gravity; • calculate the volume of solids, liquids and gases; • understand the concept of energy (physics); • comprehend how work, heat and power are interrelated; • know what is oscillatory motion and vibration; • tell the physical differences between fluids and gases and obtain fluid pressures. • understand the principles of electricity and magnetism					
Prerequisites	None	Required	MAME 101			
Course Content	**1.1 Mass and Volume** • particle distribution and behaviour of solids, liquids and gases • what is mass and its characteristics					

- centre of mass
- relationship between mass, weight and mass density
- how does temperature affect mass density
- distinction between mass and weight
- how are mass movements related to ship motions and stability
- appreciate the mass density of various materials such as steel, wood, plastic, aluminium, titanium, copper, zinc, etc.

1.2 Speed, Velocity and Acceleration

- displacement and motion diagrams
- present Newton's Laws of Motion
- dimensions and units
- motion in one, two, and three dimensions
- conversion between different system of units
- difference between speed, velocity and acceleration
- link velocity and acceleration changes to motions and stability
- calculate velocity changes
- plotting and interpreting variations in velocity and acceleration in graphical form

1.3 Energy, Work and Power

- definitions of energy, work and power
- gravitational potential and kinetic energy
- spring potential energy
- systems and energy conservation
- work generation in different contexts e.g., heat engines, mass movement, etc.
- conversion of heat into work and work into heat
- examples of energy, work and power problems
- energy density of liquid and gaseous fuels used in marine applications
- energy and work examples from cargo un/loading, main and auxiliary engine energy conversion

1.4 Fluid and Pressure

- mass density and pressure in fluids
- hydrostatic pressure
- relative density and numerical examples
- examples of hydrostatic pressure in crude oil, refined products, chemical cargo, LPG and LNG tanks
- pressure measuring gauges such as a piezometer, manometer, barometer, bourdon pressure gauge and others
- hydrostatic forces on ship's hull and seawater ballast tanks
- variation of pressure with respect to fluid depth
- influence of mass density and temperature changes on pressure

1.5 Oscillatory Motion and Waves

- simple harmonic motion

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force law and energy in simple harmonic motion
simple harmonic oscillator and pendulums
damped simple harmonic motion
forced oscillations and resonance
transverse and longitudinal waves
wavelength and frequency
speed of a travelling wave
wave equation and superposition

1.6 Electricity and Magnetism

electric current
resistance and Ohm's Law
power
single and multi-loop circuits
magnetic fields
magnetic force on a current-carrying wire
calculating magnetic field due a current

</td></tr>
<tr><td>Teaching Methodology</td><td>Lectures, Problem sheets, and Practical Sessions</td></tr>
<tr><td>Bibliography</td><td>
Required Textbooks/Reading:
<table>
<tr><th>Authors</th><th>Title</th><th>Publisher</th><th>Year</th><th>Library Access</th></tr>
<tr><td>US Department of Energy</td><td>DOE fundamentals handbook: Thermodynamics, heat transfer, and fluid flow</td><td>Departme nt of Energy (DOE), USA</td><td>1992</td><td>Freely available online</td></tr>
</table>
Recommended Textbooks/Reading:
<table>
<tr><th>Authors</th><th>Title</th><th>Publisher</th><th>Year</th><th>Library Access</th></tr>
<tr><td>Michael Browne</td><td>Schaum's Outline of Physics for Engineering and Science, 3rd edition</td><td>Schaum's Outlines</td><td>2013</td><td></td></tr>
<tr><td>David Halliday, Robert Resnick, Jearl Walker</td><td>Fundamentals of Physics, 10th edition</td><td>Wiley</td><td>2014</td><td></td></tr>
<tr><td>Louis A Bloomfield</td><td>How Things Work: The Physics Of Everyday Life, 5th ed.</td><td>Wiley</td><td>2013</td><td></td></tr>
</table>
</td></tr>
<tr><td>Assessment</td><td>Midterm Exam, Final Exam, Laboratory Reports</td></tr>
<tr><td>Language</td><td>English</td></tr>
</table>

COURSE DESCRIPTION

Course Title	Electrical Drawing					
Course Code	MAET-121					
Course Type	Required					
Level	1st Cycle					
Year / Semester	1st Year, Spring Semester					
Teacher's Name	Dr. Andreas Michaelides					
ECTS	4	Theory	Laboratory	Simulation	Tutorial	Seminar
		---	3	---	1	---
Course Purpose and Objectives	The main objectives of the course are to: • Provide the student with the basic knowledge of electrical and electronic graphic symbols used in the diagrams; • Introduce software for the design of single and multiphase systems; • Establish an overall understanding of types of electrical and electronic diagrams; • Develop a thorough understanding of technical documentation of ship equipment and machinery; • Expand the necessary practical skills required for interpretation of electrical and electronic diagrams and operating manuals of ship equipment.					
Learning Outcomes	After completion of the course students are expected to be able to: • Sketch and explain the symbols of electric circuits, electrical equipment, measurement sensors and electric measuring devices; • Draw up and explain the symbols of lighting fixtures, switches, sockets, connection boxes; • Identify the basic differences between the electrical diagrams.					
Prerequisites	MAET-112	Required	MAET-115			
Course Content	• Graphic symbols • Symbols and design of electric generators, motors, transformers • Symbols and design of electrical apparatus: contacts, switches, breakers, relays, time-delay relays, thermal relays, contactors, signal lights, fuses • Symbols and design of measurement sensors and electric measuring devices • Symbols and design of lighting fixtures, switches, sockets, connection boxes, draws up and explains the symbols of electronic elements: diodes, bipolar transistors, thyristors (SCRs), GTOs, TRIACs, MOSFETs, IGBTs, IGCTs • Diagrams, block, system, circuit, wiring, view • Technical documentation • Reading and classification of diagrams					

<table>
<tr><td></td><td>• Effective technical report writing techniques</td></tr>
<tr><td>Teaching Methodology</td><td>Briefing on the theoretical and technical contents of the drawings, presentation of
supplemental information, student discussions, direct instruction and supervision of
laboratory work</td></tr>
<tr><td>Bibliography</td><td>Required Textbooks/Reading:
<table><tr><th>Authors</th><th>Title</th><th>Publisher</th><th>Year</th><th>ISBN</th></tr><tr><td>Neil Sclater, John E. Traister</td><td>Handbook of Electrical Design Details</td><td>Mc-Graw Hill</td><td>2003</td><td>9780071377515</td></tr><tr><td colspan="5">Various technical documentation of ship electrical devices and systems</td></tr></table>
Recommended Textbooks/Reading:
<table><tr><th>Authors</th><th>Title</th><th>Publisher</th><th>Year</th><th>ISBN</th></tr><tr><td>Cornel Barbu</td><td>How to read electrical drawings</td><td></td><td>2008</td><td>9781435713208</td></tr><tr><td>IEEE</td><td>Graphic Symbols for Electrical and Electronic Diagrams</td><td>Inst of Elect & Electronic</td><td>1975</td><td>9781559374200</td></tr></table></td></tr>
<tr><td>Assessment</td><td>Homework, exams, Lab reports, lab performance and methodology, final exam</td></tr>
<tr><td>Language</td><td>English</td></tr>
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APPENDIX D

Marinem's Projects

Project	Programme	Status	Duration	Short Description	Project Total Funding	MARINEM income
People Localization for save ship evacuation during emergency - Lynceus	FP7 Programme	Completed	36	The objective of the project was to investigate and demonstrate ultra-low power wireless body-area-network technologies for enabling unobtrusive localisation and tracking of people for onboard and overboard search and rescue as well as for safe evacuation of ships during emergency.	2,536,114.90 €	316,791.43 €
Innovative Ship Energy Management for Pollution and Fuel Consumption control - SmartShip	FP7 Programme	Rejected	36	The objective of the SmartShip project is to investigate and demonstrate ultra-low power wireless sensor network technologies for enabling real time and automatic monitoring and continuous control of various energy efficiency parameters and emission footprint in ships. The SmartShip technology aims to revolutionise current energy management and pollution control practices through the development of beyond the state-of-the-art real-time system with its associated monitoring and decision support tools which will significantly contribute towards optimising energy performance, fuel efficiency and operation safety. Through the development of robust wireless sensor technologies, advanced sensor data processing and fusion techniques, innovative decision support processes, low powered microelectronics and digital signal processing algorithms, SmartShip will provide the ship management with a powerful management system which will help taking the best decisions towards improving energy efficiency and reducing fuel consumption and emissions. The SmartShip novel technology will be transferred into the		

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				SME-driven market segments of Heating Ventilation and Airconditioning (HVAC) monitoring, lighting and plant auxiliaries monitor and control, reliability and machine system optimization and predictive maintenance. The proposed research will generate high societal and market impact for the European SMEs, and will enable major technological breakthroughs in the areas of ultra-low power wireless systems, wireless and sensor electronics, digital signal processing, energy efficiency and decision support systems.		
An innovative people localisation system for safe evacuation of large passenger ships - Lynceus2Market	HORIZON 2020	Running	36	The objective of the LYNCEUS2MARKET project is to improve and optimise current technologies and prototypes developed by the LYNCEUS consortium in order to deliver innovative wireless devices that can be easily integrated in new and existing passenger ship infrastructure providing a low-cost and robust safe evacuation system. This innovative system will enable on-board and overboard people localisation, person activity monitoring, real-time disaster escalation monitoring and adaptive decision support.	7,260,975.00 €	582,500.00 €
Development of an autonomous Container Data Onboard Recorder - ConDOR	HORIZON 2020	Rejected	36	The main purpose of the ConDOR Project is to design and develop a small size, sophisticated, portable, and autonomous device; the ConDOR will be installed inside each container and will be able to maintain various cargo-related data, including weight, the ambient conditions, the location of the container onboard the vessel and/or acceleration. It will also include sensors for detecting hazardous materials or explosive gases, movement and for measuring vibrations.		
Increased Resilience and Reduced Risk in Maritime Emergencies -	HORIZON 2020	Passed the 1st stage	36	The MIRROR project contributes to reducing risks and increasing resilience in maritime emergency situations through focused innovations and nowledge creation in ship design, marine equipment and information technologies. Focus is on cruise and RoPax vessels, due to their high risks related to life,		

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MIRROR				property and the environment, but various developments have impact beyond these vessels. Various stages in the life-cycle of these vessels are addressed in different operational contexts.		
Marine Linkages Towards an Advanced Cooperative United Space - MARELINK	HORIZON 2020	Rejected	36	This project primarily aims to build a "strategic pan European partnership" to promote, develop and further exploit the cooperation of EU marine actors. The proposed project aims, mainly, to identify and analyse the real barriers to integration of the various activities through a perspective and clear methodology, which will enhance compatibility, egulatory, environmental, safety, societal and legal issues taking into consideration the needs and the priorities of the various marine activities and the different European countries. Therefore, the main goal of the project is to bring together representatives and experts of the various marine activities (e.g. renewable energy offshore companies, ports, maritime operators, experts on maritime spatial planning, research institutes for marine studies and institutes related to archaeological and environmental issues of the oceans) with local communities and policy sector in order to discuss their needs and priorities and envision a common future of the oceans' marine space.		
Blow Growth Centre of Excellence in the South-Eastern Mediterranean - TRITON	HORIZON 2020		12	he TRITON consortium aims to create a Blue Growth Centre of Excellence in the South-eastern Mediterranean based in Cyprus to act as an enabler of Excellence in Marine and Maritime issues in the broader South-eastern Mediterranean. The Centre will be aligned to the overall Smart Specialization Strategy for Cyprus (S3CY) and the European priorities on specific pillars with competitive advantages to the Cypriot economy. Focusing on sectors such as energy, tourism, transport and shipping, TRITON Centre of Excellence will seek partnering		

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				relationships with well-known European institutions that will assist to the transfer of knowledge, co-develop sustainability and research programs, handover best practices and consult towards the creation of a critical mass of infrastructure and human capital in the region.		
Maritime Clusters supporting Research & Innovation to enhance Blue Economy Entrepreneurship - CoRINThos	Interreg MED Programme	Completed	12	Tackled R&D gaps as a driving factor of maritime clusters, identifying and contextualizing them within Blue Economy sectors and geographical eco systemic synergies, at national and transnational level.	328,844.04 €	70,657.97 €
Mediterranean Network for Custom Procedures and Simplification of Clearance in Ports - MEDNET	Interreg MED Programme	Completed	36	Aimed to establish and operate a network of port authorities and transport experts in the Mediterranean region, focusing on the exchange of knowledge and expertise with regard to port and custom procedures and simplification of clearance for vessels and cargoes. This is expected to enhance the common understanding and promote the introduction of information systems to ports operation and potentially to other intermodal modes.	2,881,780.79 €	92,179.44 €
Blue Integrated and Smart Growth in Mediterranean Basin - BrightICT	Interreg MED Programme	Rejected	36	The BrightICT project will empower a selective group of partners that represent different economic or policy sectors and it will create a sustainable network which through an integrated territorially based cooperation approach will promote a more resource-efficient, competitive and bluer economy in the Mediterranean area, based on the use of the state of the art of the new ICT technologies.	2,105,800.00 €	Total eligible budget 172,400.00 € ERDF 146,540.00 € Co-financing rate 85.00 % Partner

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						contribution 25,860.00 €
Promoting innovative NEtworks and cLusters for mArine renewable energy power Grid synergies in Mediterranean Coasts and iSlands - PELAGOS	Interreg MED Programme	Passed 1st stage	36	The project aims to increase the innovation capacities and cooperation of BE ctors in MED through promoting a transnational cluster, bringing them together in order to develop a shared understanding of the challenges and collectively devise workable solutions. PELAGOS will establish a Cluster in Blue Energy that will promote novel technologies and provide a mix of support activities to beneficiaries such as technology providers, enterprises, financial operators, authorities, NGOs end citizens. The project will enhance internationalization of the Cluster members through a range of activities that will jointly identify opportunities of BE in Mediterranean insular and coastal regions. This will be achieved through fine-tuning of existing know-how, development of skills, identification of common business opportunities and facilitation of growth by bridging providers and users in targeted maritime industries. The development of this emerging sector can become an important part of the blue economy, fuelling economic growth in coastal regions and create new, high-quality jobs.	2,396,104.00 €	Total eligible budget 238,890.00 € ERDF 203,056.50 € Co-financing rate 85.00 % Partner contribution 35,833.50 €
PROmoting security and safeTy by crEating a MED clUster on Maritime Surveillance - PROteuS	Interreg MED Programme	Passed 1st stage	36	PROteuS project aims at exploiting the growth potential of the emerging Maritime Surveillance industry that can play a crucial role in the socio-economic development of MED area and in the generation of new job opportunities. This objective will be addressed through the establishment of a MED MS Cluster, fostering innovation and R&D capacities, knowledge and technology transfer, as well as	2,230,312.00 €	Partner contribution 30,181.20 € Total eligible budget 201,20 ERDF 171,026.80 €8.00 €

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				transnational cooperation among the involved key MS actors, focusing on maritime security and safety mechanisms in MED area. The Cluster will offer customized services in order to identify and exploit technologies related to MS and will achieve transferability through the creation of concrete linkages with other Blue Growth sectors that face common challenges and growth opportunities.		
Environmental Protection and Legislation of Balkan Med ports and surrounding areas based on Innovative Tools and Methods - ECOPORTIL	Interreg BALKAN Programme	Submitted on 15/04/2016	30	ECOPORTIL aims to improve the environmental quality of ports and support their sustainability, implementing modern methodologies and good practices according to EU and national legislation as well as innovative tools for the training and capacity building of stakeholders in the ports and nearby coastal zones as a prevention measure of pollution and preservation of natural maritime resources. The central scope of the Project is to capitalize the results of project TEN-ECOPORT and the delivered analysis on EU and national standards; to exploit existing methods and monitoring systems at ports and coastal areas in order to provide all essential advances between monitoring and regulation requirements. There will take into account the needs of ports in order to create productive methodologies (common shared guidelines) for implementation of EU and national legislations and there will be provided special education and training processes.	878,000.000 €	114,750.00 €
NAYS	Interreg GR-CY Programme	Submitted on 22/04/2016	30	Στόχος του ΝΑΥΣ είναι να αξιοποιήσει τις ναυτιλιακές πληροφορίες προσέγγισης κρουαζιερόπλοιων στους λιμένες υποδοχής Ελλάδας – Κύπρου (λιμάνια εφαρμογής: Ηράκλειο, Ρόδος, Λάρνακα, Λεμεσός) για την αποτελεσματικότερη διαχείριση των εφοδιαστικών αλυσίδων για την τροφοδοσία και εξυπηρέτηση της κρουαζιέρας. Το έργο θα αναλύσει τις προτιμήσεις των επιβατών και θα τις συνδέσει με τοπικές	999,126.63 €	136,383.56 €

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				υπηρεσίες και αγορές προϊόντων, με στόχο την ενίσχυση της συνεργασίας με τοπικούς φορείς. Επιπρόσθετα, θα δημιουργήσει ένα δίκτυο συνεργασίας και ανταλλαγής των ναυτιλιακών εταιρειών κρουαζιέρας και της τοπικής αγοράς με τους λιμένες εφαρμογής, με το σχεδιασμό μιας ηλεκτρονικής πλατφόρμας ανταλλαγής πληροφοριών και παροχής υπηρεσιών για την υποστήριξη των στόχων του έργου.		
Maritime Clusters Network for Blue Growth - BlueNET	EMFF Work Programme 2016	Successful Starts on 01/09/2016	24	The main goal of the BlueNET Project is to facilitate SMEs collaboration and networking in the Mediterranean and Black Sea regions. Project activities will focus on building up the necessary tools to support transnational networking activities and diffuse their use at territorial level. The organization of joint communication events will play an important role to raise awareness of local governments, innovation facilitators and SMEs on blue growth issues. Furthermore, the exchange of best practices and the setting up of a joint database will provide information on concrete opportunities of cooperation for SMEs, R&I centers and industrial clusters. Project stakeholders will have the possibility of accessing tools that will make easier the identification of strategic areas and the planning of investments in fast growing sectors, that could have a positive economic impacts on local economic and employment development. At the end of the Project, a common methodology to collect technology features and innovation needs in each maritime cluster and establish cooperation links on joint innovation paths will be developed and tested. Moreover, a strong cooperation among the partners will grow during the Project and will give rise to a structured process for transnational cluster development, that is expected to continue after project cycle		
MENTOR - Blue	EMFF Work	Submitted on	24	The general objective of this proposal is to set up a regional	722,504 €	

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Career Centre of Eastern Mediterranean and Black Sea	Programme 2016	31/05/2016		platform – the Blue Career Centre - for dialogue between business stakeholders, education & training institutions, research organizations, regulators, the civic society as well as the EU and the Union for the Mediterranean allowing them to jointly develop and carry out measures to close the skill gap, tackle unemployment and make "blue careers" more attractive to the young people of the area. Working closely and actively within the Marine and Maritime Cluster in the Eastern Mediterranean and the Black Sea the Centre will act as a facilitator and mediator of change, encouraging the blue sector industries & businesses to take on leadership roles and see beyond immediate and individual company interests. This way the Cluster will respond to the major concerns related to the skills gap and the shortage of qualified professionals in the respective sectors. As it has been repeatedly stressed out; at forums and conferences around Europe and at various levels; our coasts and seas have the potential to deliver growth and jobs in the coming years. But as it has also been highlighted in order to achieve Blue Growth i.e. the sustainable growth in the marine and maritime sectors we need highly qualified and skilled professionals. Yet many Blue Sectors are still experiencing difficulties in finding the right employees and many expect that these difficulties will continue throughout the foreseeable future. It is for these reasons that four Marine and Maritime Economic Activities (MEAs) have been selected – at this stage - as of strategic importance in the EM & BS region: 1. Maritime Transport (i.e. shipping, ports, shipbuilding and ship-repairs) 2. Cruise Tourism, 3. Marine Aquaculture (mainly in the Eastern Mediterranean)		

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				and 4. Offshore oil and gas. Of these, Maritime Transport is a mature MEA whereas aquaculture and cruise tourism are growing MEAs and offshore oil and gas is an emerging MEA in this area.		
Innovative solutions for marine aquaculture in the Mediterranean basin - Inno-Aqua-MED	EMFF Work Programme 2016		24	The Inno-Aqua-MED will develop investment plans for technical innovation in aquaculture by mobilising public-private partnerships into three bankable/ready-to invest demonstration projects that will increase the competitiveness and image of the sector, improve the quality and nutritional value of the product and decrease the ecological footprint. Based on current sectoral mapping, benchmarking and stakeholder consultation the demonstration projects will focus on: 1. Sustainable innovations in the production chain. 2. Blue biotechnologies for mariculture. 3. Multi-stakeholder offshore operations.		
GOVERNBLUE	Industrial relations and social dialogue	Rejected	18	The project aims to investigate the future of industrial relations in the three future Mediterranean clusters, to develop a new agenda in the social dialogue, based on current economic situation in each area, with the future aim of reaching a new stage of social dialogue and multisector industrial relations, overcoming the current situation of dispersion governance and individual characteristics of each sector.	251,535.38 €	

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