

Course Title	Mathematics II					
Course Code	MANS-103					
Course Type	Required					
Level	2 nd Cycle					
Year / Semester	1 st Year, Spring Semester					
Teacher's Name	Mrs. Panayiota Argyrou					
ECTS	3	Theory	Laboratory	Simulation	Tutorial	Seminar
		2	----	----	-----	----
Course Purpose and Objectives	<p>The main objectives of the course are</p> <ul style="list-style-type: none"> • trigonometric functions and operations; • basic geometry 					
Learning Outcomes	<p>After completion of the course students are expected to be able to:</p> <ul style="list-style-type: none"> • 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	MANS-101	Required		None		
Course Content	<p>1. TRIGONOMETRY</p> <ul style="list-style-type: none"> • 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 $\sin^2 a + \cos^2 a = 1$ and $\sin a / \cos a = \tan a$ in solving simple identities
- 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

	<ul style="list-style-type: none"> 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 <p>solves problems on spherical triangles by dropping a perpendicular and solving the resulting right-angled triangle</p>																														
Teaching Methodology	Lectures and Assignments																														
Bibliography	<p>Required Textbooks/Reading:</p> <table border="1"> <thead> <tr> <th>Authors</th> <th>Title</th> <th>Publisher</th> <th>Year</th> <th>Library Access</th> </tr> </thead> <tbody> <tr> <td>M. Sullivan and M. Sullivan III</td> <td>Precalculus</td> <td>Pearson</td> <td>2017 7th Edition</td> <td>Print copy at library</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Authors</th> <th>Title</th> <th>Publisher</th> <th>Year</th> <th>Library Access</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>Recommended Textbooks/Reading:</p> <table border="1"> <thead> <tr> <th>Authors</th> <th>Title</th> <th>Publisher</th> <th>Year</th> <th>Library Access</th> </tr> </thead> <tbody> <tr> <td>M. Bittinger, J. Beecher, D. Ellenbogen, J. Penna</td> <td>Precalculus: Graphs and Models</td> <td>Pearson</td> <td>2017 6th Edition</td> <td>Print copy at library</td> </tr> </tbody> </table>	Authors	Title	Publisher	Year	Library Access	M. Sullivan and M. Sullivan III	Precalculus	Pearson	2017 7 th Edition	Print copy at library	Authors	Title	Publisher	Year	Library Access	H. Anton, I. Bivens, S. Davis III	Calculus	Wiley	2012 10 th Edition	Print copy at library	Authors	Title	Publisher	Year	Library Access	M. Bittinger, J. Beecher, D. Ellenbogen, J. Penna	Precalculus: Graphs and Models	Pearson	2017 6 th Edition	Print copy at library
Authors	Title	Publisher	Year	Library Access																											
M. Sullivan and M. Sullivan III	Precalculus	Pearson	2017 7 th Edition	Print copy at library																											
Authors	Title	Publisher	Year	Library Access																											
H. Anton, I. Bivens, S. Davis III	Calculus	Wiley	2012 10 th Edition	Print copy at library																											
Authors	Title	Publisher	Year	Library Access																											
M. Bittinger, J. Beecher, D. Ellenbogen, J. Penna	Precalculus: Graphs and Models	Pearson	2017 6 th Edition	Print copy at library																											
Assessment	Midterm Exam, Final Exam, Assignments																														
Language	English																														