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| Course Title | **Mathematics I** |
| Course Code | MANS-101 |
| Course Type | Required |
| Level | 1st Cycle |
| Year / Semester | 1st Year, Fall Semester  |
| Teacher’s Name |  |
| ECTS | 6 | Theory | Laboratory | Simulation | Tutorial | Seminar |
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| 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
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| 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
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| Prerequisites | None | Required | MANS -102,  |
| 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
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| Teaching Methodology | Lectures and Assignments |
| Bibliography | **Required Textbooks/Reading:**

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| **Authors** | **Title** | **Publisher** | **Year** | **Library Access** |
| M. Sullivan and M. Sullivan III | Precalculus | Pearson | 20177th Edition | Print copy at library |

**Recommended Textbooks/Reading:**

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| **Authors** | **Title** | **Publisher** | **Year** | **Library Access** |
| M. Bittinger, J. Beecher, D. Ellenbogen, J. Penna | Precalculus: Graphs and Models | Pearson | 20176th Edition | Print copy at library |

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| Assessment | Midterm Exam, Final Exam, Assignments |
| Language | English |