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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 |
| 4 | ----- | | ----- | | ----- | ---- |
| 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 | | 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 | | | | | | | |
| Teaching Methodology | Lectures and Assignments | | | | | | | |
| Bibliography | **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 Edition | Print copy at library | | | | | | | | |
| Assessment | Midterm Exam, Final Exam, Assignments | | | | | | | |
| Language | English | | | | | | | |