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| Name                                       | <i>Programming</i>   |
| ECTS credits                               | <i>4</i>   |
| Year / Semester                            | <i>1/1°</i>  |
| Specific learning outcomes                 | <i>On successful completion of this module students should be able to:<br/>1 – Develop program in MATLAB language (vector, matrix, for loop, if-then-else loop, functions, graphs, etc...),<br/>2 – Use MATLAB functions such as : interpolation,integration, derivation, resolution of non-linear equations, resolution of differential equations, optimization etc...<br/>3 – Participate in class discussions with colleagues and with teachers</i>   |
| Contents                                   | <i>Using MATLAB(Arithmetic, Variables, Mathematical functions, Functions and commands, Vectors), MATLAB Fundamentals (Vectors and Matrices, Operators, Expressions, and Statements, Output, for loop, if-then-else loop), Program Design and Algorithm Development(The Program Design Process, Structured Programming with Functions), MATLAB Functions and Data Import–Export Utilities (Common Functions, Importing and Exporting Data), Introduction to Graphics(2D and 3D graphs), Introduction to Numerical Methods (Equations, Integration, Numerical Differentiation, First-Order Differential Equations, Linear Ordinary Differential Equations, Runge-Kutta Methods, A Partial Differential Equation, Other Numerical Methods, optimization).</i> |
| Teaching and learning methods              | <i>Face to face, 45 hours</i>  |
| Teaching techniques                        | <i>Practical classes, 45 hours</i>   |
| Assessment methods                         | <i>Written and oral.<br/>A first-term written test and a second-term written test are not foreseen.<br/>The first-term written test will be devoted to the assessment of the level of achievement of LOs 1.<br/>The final term written test will be devoted to the assessment of the level of achievement of LOs 2.</i>  |
| Assessment criteria                        | <i>In the first-term test students should demonstrate their ability to write and test a program. In the final term test students will be able to develop any program in process engineering.<br/>Finally, students' ability to participate in class discussions with teachers and colleagues will be assessed in practical classes.</i>  |
| Assessment metrics                         | <i>Attribution of a final grade</i>  |
| Criteria of attribution of the final grade | <i>The grade goes from 1 (minimum) up to 10 (maximum). The minimum threshold to pass is 6. To pass the exam students should obtain the minimum evaluation in all the assessments.<br/>The final grade will be determined according to the following rules:<br/>- Written exam: 70%<br/>- term written test: 30%</i>  |
| Preparatory course units                   | <i>N.A.</i>  |
| Didactic material                          | <i>B. Hahn &amp; D. Valentine, "Essential Matlab for engineers and scientists ", C. Woodford and C. Phillips, "Numerical methods with worked examples : : Matlab edition"</i>  |