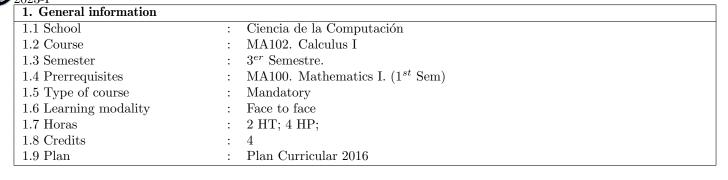
# San Pablo Catholic University (UCSP) Undergraduate Program in Computer Science SILABO

## MA102. Calculus I (Mandatory)



2. Professors

Universidad Católica San Pablo

#### 3. Course foundation

This course introduces the first concepts of linear algebra as well as numerical methods with an emphasis on problem solving with the Scilab open source libe package. Mathematical theory is limited to fundamentals, while effective application for problem solving is privileged. In each subject, a few methods of relevance for engineering are taught. Knowledge of these methods prepares students for the search for more advanced alternatives, if required.

#### 4. Summary

1. Introduction 2. Linear Algebra 3. Numerical methods

#### 5. Generales Goals

- Ability to apply knowledge about Mathematics.
- Ability to apply engineering knowledge.
- Ability to apply the modern knowledge, techniques, skills and tools of modern engineering to the practice of engineering

#### 6. Contribution to Outcomes

This discipline contributes to the achievement of the following outcomes:

- 1) Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions. (Assessment)
- 6) Apply computer science theory and software development fundamentals to produce computing-based solutions. (Assessment)

7. Content

UNIT 1: Introduction (18)	
Competences:	
Content	Generales Goals
• Importance of linear algebra and numerical methods. Examples.	• Be able to understand the basic concepts and impor- tance of Linear Algebra and Numerical Methods.
<b>Readings:</b> Anton and Rorres (2014), Chapra and Canale (12015)	

Content	Generales Goals
<ul> <li>Elementary matrix algebra and determinants</li> <li>Null space and exact solutions of systems of linear equations Ax=b: <ul> <li>Tridiagonal and triangular systems and Gaussian elimination with and without pivoting.</li> <li>LU factorization and Crout algorithm.</li> </ul> </li> <li>Basics on eigenvalues and eigenvectors: <ul> <li>Characteristic polynomials.</li> <li>Algebraic and geometric multiplicities.</li> </ul> </li> <li>Least squares estimation.</li> <li>Linear transformations.</li> </ul>	<ul> <li>Understanding the basics concepts of Linear Algebra.</li> <li>Solve properly linear transformations problems.</li> </ul>

<sup>8.</sup> Methodology

- 1. El profesor del curso presentará clases teóricas de los temas señalados en el programa propiciando la intervención de los alumnos.
- 2. El profesor del curso presentará demostraciones para fundamentar clases teóricas.
- 3. El profesor y los alumnos realizarán prácticas
- 4. Los alumnos deberán asistir a clase habiendo leído lo que el profesor va a presentar. De esta manera se facilitará la comprensión y los estudiantes estarán en mejores condiciones de hacer consultas en clase.

### 9. Assessment

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Continuous Assessment 1 : 20 \%
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Partial Exam : 30 % Continuous Assessment 2 : 20 %

Final exam : 30 %

### References

Anton, H. and C. Rorres (2014). *Elementary Linear Algebra, Applications Version*. 11th. Wiley. Chapra, S.C. and R.P. Canale (12015). *Numerical Methods for Engineers*, 7th. Vol. 1. McGraw-Hill.