

SCHOOL OF HEALTH AND SCIENCES

SYLLABUS

TITLE:	Pre-calculus II
CODE:	MAT 134
PREREQUISITE	MAT 133
CREDITS:	4 credits 45 contact hours 1 term

DESCRIPTION

The Pre-calculus II course, continuation of Pre-calculus I, is a theoretical and practical mathematics course for the students at the School of Health and Sciences. It includes the study of functions such as systems of equations, sequences and series, trigonometric functions, analytic trigonometry, and complex numbers. The purpose of the course is to lay the analytical and geometric foundations necessary for the study of differential and integral calculus.

JUSTIFICATION

Students will acquire the concept of function and develop skills in the interpretation of the different functions so that they can understand the fundamental concepts of calculus, which has applications in the fields of physics, chemistry, and biology.

COMPETENCES

The course develops the following competences in students:

- **Critical questioning**
- **Research and exploration**

OBJECTIVES

After completion of the course, students will be able to:

1. Solve systems of equations.
2. Find the formula for a succession according to its elements.

3. Find partial sums of finite series and sums of infinite series
4. Analyze, evaluate, and represent trigonometric functions in graphs.
5. Demonstrate trigonometric identities.
6. Identify and use trigonometric formulas.
7. Solve trigonometric equations.
8. Apply the laws of sine and cosine to solve triangles.
9. Define, represent, and perform operations with complex numbers.

CONTENTS

- I. Systems of Equations
 - A. Solving systems of equations
 1. Elimination
 2. Augmented matrix
 3. Cramer's rule
 - B. Linear system applications
 - C. Matrix operations
 - D. Nonlinear systems
- II. Natural Domain Functions
 - A. Succession
 1. Arithmetic
 2. Geometric
 - B. Series
 - C. Applications
- III. Trigonometric functions
 - A. The unrolling function
 1. Domain and range (values)
 - B. Circular Functions
 - C. Function Properties
 - D. Graphs
 1. Amplitude
 2. Fundamental period
 3. Phase shift
 - E. Trigonometric angle functions

- IV. Analytical Trigonometry
 - A. Fundamental trigonometric identities
 - B. Trigonometric formulas
 - C. Inverse trigonometric functions
 - D. Trigonometric equations
- V. Triangle Trigonometry
 - A. Change of notation from radians to degrees and from degrees to radians
 - B. Right triangle trigonometry
 - C. Laws of sine and cosine
 - D. Polar coordinates
 - E. Word problems
- VI. Complex Numbers
 - A. Definition and properties
 - B. Operations
 - C. Rectangular and polar shape
 - D. Geometric representation
 - E. Equations with complex numbers
 - F. De Moivre's theorem
 - 1. Roots and powers of complex numbers
 - G. Complex zeros of polynomial functions

METHODOLOGY

The following strategies from the active learning methodology are recommended:

- Flipped classroom
- Problem discussion
- Collaborative learning
- Teamwork
- Procedure and problem-solving oriented coaching
- Demonstration and practical exercises
- Self-assessment and peer assessment
- Application of theorems and formulas
- Problem based learning

EVALUATION

Participation	10%
Compositions	20%
Partial assignments	40%
Final exam	30%
Total	100%

LEARNING ASSESSMENT

The institutional assessment rubric is applied to the course's core activity.

BIBLIOGRAPHY

TEXTBOOK

Abramson, J. (2021). *Precalculus*. Openstax.

REFERENCES

Larson, R., Falvo, D.C. (2022). *Precalculus with limits* (5th ed.). Cengage Learning.

Miller, J., Gerken, D. (2017). *Precalculus* (1st ed.). McGraw-Hill Education.

Ruiz Basto, J. (2016). *Matemáticas 4: Precálculo: Funciones y aplicaciones* (2nd ed.). Grupo Editorial Patria.

Sullivan, M. (2020). *Precalculus* (11th ed.). Prentice Hall.

Swokowski, E. (2019). *Precalculus: Functions & Graphs* (13th ed.). Addison Wesley

ELECTRONIC RESOURCES

GeoGebra for Teaching and Learning Math: <https://www.geogebra.org/>

Let's learn together: <https://www.desmos.com/>

Precalculus: <https://openstax.org/details/books/precalculus>

Precalculus: <https://www.khanacademy.org/math/precalculus>

Symbolab: <https://www.symbolab.com/>

Wolframalpha Computational Intelligence: <https://www.wolframalpha.com/>

For more information resources related to the course's topics, access the library's webpage <http://biblioteca.sagrado.edu/>

REASONABLE ACCOMMODATION

For detailed information on the process and required documentation you should visit the corresponding office. To ensure equal conditions, in compliance with the ADA Act (1990) and the Rehabilitation Act (1973), as amended, any student in need of reasonable accommodation or special assistance must complete the process established by the Vice Presidency for Academic Affairs.

ACADEMIC INTEGRITY

This policy applies to all students enrolled at Universidad del Sagrado Corazón to take courses with or without academic credit. A lack of academic integrity is any act or omission that does not demonstrate the honesty, transparency, and responsibility that should characterize all academic activity. Any student who fails to comply with the Honesty, Fraud, and Plagiarism Policy is exposed to the following sanctions: receive a grade of zero in the evaluation and / or repetition of the assignment in the seminar, a grade of F (*) in the seminar, suspension, or expulsion as established in the Academic Integrity Policy effective in November 2022.

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