SAGRADO
Universidad del Sagrado Corazón

SYLLABUS

TITLE: Precalculus I

CODE: MAT 133

PREREQUISITE: N/A

CREDITS: 3 credits | 45 hours contact | 1 term

DESCRIPTION

The Pre-Calculus I course is a theoretical and practical course for Natural Sciences programs. Emphasizes the concept of function, relationship, and graphs. Study of polynomial, rational, exponential and logarithmic functions. The properties of the functions, the transformations of the functions and their applications are studied. Emphasis on problem solving. The purpose of the course is to lay the analytical and geometric bases necessary for the study of differential and integral calculus.

JUSTIFICATION

It is a required course in Natural Sciences programs, the student must acquire the concept of function and develop skills in the interpretation of the different functions so that later thay can understand the basic concepts of Calculus, which has applications in the fields of Physics, Chemistry, Biology and subsequent courses in Mathematics.

COMPETENCES

The course develops in the student the following competencies:

- **Critical Thinking**

OBJECTIVES

At the end of the course, students will be trained to:

1. Define the concepts of relationship and function.
2. Apply the properties of the functions.

3. Identify linear, quadratic, polynomial, rational, exponential, and logarithmic functions.
4. Draw the graphs to interpret the functions.
5. Solve word problems.

CONTENT

I. Relationships

A. Definition
B. Graphics
C. Graphs and equations of circles

II. Functions

A. Definition
B. Domain and equations of circles
C. Properties of functions
   1. Even and odd
   2. Increasing and decreasing
D. Special functions and their graphs
   1. Identity function
   2. Absolute value function
   3. Constant function
   4. Whole part function
   5. Quadratic function
   6. Split domain function
   7. Function with radicals
E. Algebra and composition of functions
   1. Addition, subtraction, multiplication and division of functions
   2. Composition of functions
F. Inverse Function
   1. Definition
   2. Determine its existence
   3. Find the inverse and plot the graph

III. Polynomial and rational functions

A. Linear function
   1. Definition
   2. Intercepts and slope
   3. Graphic

4. Slope-intercept form
5. Point-slope form
6. Relative positions of two lines

B. Quadratic function
1. Definition
2. Quadratic equation

C. Solution
1. By factoring
2. Completing the square
3. Quadratic formula

IV. Graph of quadratic functions

A. extreme point coordinates
B. coordinates of intercepts
C. Maximus and minimous
D. verbal problems

V. Quadratic inequalities

A. Solution
1. Graph
2. algebraic

B. Polynomial functions of degree greater than two
1. Definition
2. zeros of polynomial
3. synthetic division
4. division algorithm
5. remainder theorem
6. remainder theorem
7. rational zeros theorem
8. graphs

D. Rational functions
1. Definition
2. Asymptotes
a. Vertical
b. Horizontal
c. Oblique
3. Graphs

IV. Transcendental functions:

A. Exponential function

1. Domain
2. Value field
3. Graphs
4. Word problems

B. Logarithmic function
1. Domain
2. Value field
3. Graphs
4. Properties
5. Common and natural logarithms

METHODOLOGY

The following strategies of the active learning methodology are recommended:

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

EVALUATION

Participation	10%
Compositions	30%
Partial works	30%
Final project or exam	30%
TOTAL	100%

LEARNING ASSESSMENT

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

BIBLIOGRAPHY

TEXTBOOK

Sullivan, M. (2020). *Precalculus*. (11th edition). New Jersey: Prentice Hall.

REFERENCES

Larson R., Falvo D.C. (2016) *Precalculus with Limits*. (4th edition) Boston: Cengage Learning.

Miller J., Gerken D. (2017) Precalculus. (1st edition) New York: McGraw-Hill Education.

Swokowski E. (2019) *Precalculus.*

ELECTRONIC REFERENCES

https://www.khanacademy.org/math/precalculus

https://www.symbolab.com/

https://www.wolframalpha.com/

Find more information resources related to the course topics on the library page http://biblioteca.sagrado.edu/

REASONABLE ACCOMMODATION

To obtain detailed information on the process and the required documentation, you must visit the corresponding office. To guarantee equal conditions, in compliance with the ADA (1990) and the Rehabilitation Act (1973), as amended, all students who need reasonable accommodation services or special assistance must complete the process established by the Vice Presidency for Academic Affairs.

ACADEMIC HONESTY, FRAUD AND PLAGIARISM

Any student who misses the policy of honesty, fraud and plagiarism is exposed to the following sanctions: received a grade of zero in the evaluation and/ or repetition of the work in the course, grade of F (*) in the seminar: suspension or expulsion as established in the Academic Honesty Policy document (DAEE 205-001) effective August 2005.