National University of the Altiplano (UNA)
School of Computer Science
Syllabus 2024-II

1. COURSE

CS210. Algorithms and Data Structures (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	CS210. Algorithms and Data Structures
2.2 Semester	:	4^{th} Semester.
2.3 Credits	:	4
2.4 Horas	:	2 HT; 4 HP;
2.5 Duration of the period	:	16 weeks
2.6 Type of course	:	Mandatory
2.7 Learning modality	:	Face to face
2.8 Prerrequisites	:	CS113. Computer Science II. (3^{rd} Sem) CS113. Computer Science II. (3^{rd} Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

The theoretical foundation of all branches of computing rests on algorithms and data structures, this course will provide participants with an introduction to these topics, thus forming a basis that will serve for the following courses in the career.

5. GOALS

- Make the student understand the importance of algorithms for solving problems.
- Introduce the student to the field of application of data structures.

6. COMPETENCES

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6) Apply computer science theory and software development fundamentals to produce computing-based solutions. ()

7. TOPICS

Unit 1: Graphs (12)	
Competences Expected:	
Topics	**Learning Outcomes**
• Graph Concept • Directed Graphs and Non-directed Graphs. • Using Graphs. • Measurement of efficiency ,in time and space. • Adjacency matrices. • Tag adjacent matrices. • Adjacency Lists. • Implementation of graphs using adjacency matrices. • Graph Implementation using adjacency lists • Insertion, search and deletion of nodes and edges. • Graph search algorithms.	• Acquire Dexterity to Perform Correct Implementation. [Usar] • Develop knowledge to decide when it is better to use one implementation technique than another. [Usar]
Readings : [**Cormen2009**], [**Fager2014**], [**Knuth97**], [**Knuth98**]	

Unit 2: Scatter Matrices (8)	
Competences Expected:	
Topics	**Learning Outcomes**
• Initial concepts. • Dense Matrices • Measurement of Efficiency in Time and Space • Static scatter vs. dynamic matrix creation. • Insert, search, and delete methods.	• Understand the use and implementation of scatter matrices.[Evaluar]
Readings : [**Cormen2009**], [**Fager2014**], [**Knuth97**], [**Knuth98**]	

Unit 3: Balanced Trees (16)	
Competences Expected:	
Topics	**Learning Outcomes**
• AVL Trees. • Measurement of Efficiency. • Simple and Composite Rotations • Insertion, deletion and search. • Trees B , B+ B* y Patricia.	• Understand the basic functions of these complex structures in order to acquire the capacity for their implementation. [Evaluar]
Readings : [**Cormen2009**], [**Fager2014**], [**Knuth97**], [**Knuth98**]	

8. WORKPLAN

8.1 Methodology

Individual and team participation is encouraged to present their ideas, motivating them with additional points in the different stages of the course evaluation.

8.2 Theory Sessions

The theory sessions are held in master classes with activities including active learning and roleplay to allow students to internalize the concepts.

8.3 Practical Sessions

The practical sessions are held in class where a series of exercises and/or practical concepts are developed through problem solving, problem solving, specific exercises and/or in application contexts.

9. EVALUATION SYSTEM

********* EVALUATION MISSING ********

10. BASIC BIBLIOGRAPHY