Modeling, Simulation and Optimization

Delgado, David dm.delgado10@uniandes.edu.co
Hernandez, Sofía ls.hernandez10@uniandes.edu.co
Mendoza, Camilo ca.mendoza968@uniandes.edu.co
Murillo, Juan jg.murillo10@uniandes.edu.co
Remolina-Gutirrez, María mc.remolina197@uniandes.edu.co

***Abstract*—This preview of an article displays the mathematical model that will describe out problem. We want to optimize the number of semesters a student with double major at Universidad de los Andes (Colombia) needs to pay in order to graduate.**

***Keywords*—mathematical model, semester planning optimization**

I. Introduction

The main objective of this article is to propose a mathematical model that solves the problem of planning the academic schedule for double program students of the University of the Andes. Thus, the mathematical model will optimize the number of semesters in which any undergraduate student would study the courses of their two undergraduate programs.

II. Parameters

In the following table we describe the conventions we will use during the article.

TABLE I. Table of conventions

Symbol	Meaning
S	Number of semesters
C	Number of courses
M_{ij}	Adjacency matrix between courses

Where:
$M_{ij} = 0$ if course i has no relation with course j
$M_{ij} = 1$ if course i is prerequisite of course j
$M_{ij} = 2$ if course i is corequisite of course j

III. Decision Variable

The decision variable we will use is:

$$x_{ij} = \text{Take course i on semester j} \tag{1}$$

Where:

$$i \in [1, C] \tag{2}$$

$$j \in [1, S] \tag{3}$$

IV. Objective function

$$n = \sum_{j} max(x_{ij}) \tag{4}$$

V. Constraints

$$\forall i, \sum_{j=1}^{S} x_{ij} = 1 \tag{5}$$

$$\forall j, \sum_{i=1}^{C} x_{ij} * \text{credits}(i) \leq 25 \tag{6}$$

$$Coreq : if \quad x_{ij} = 1 \qquad \Rightarrow \qquad \forall a | M_{ai} = 2; x_{aj} = 1 \tag{7}$$

$$Prereq : if \quad x_{ij} = 1 \qquad \Rightarrow \qquad \forall a | M_{ai} = 1; \sum_{k=1}^{j-1} x_{ak} = 1 \tag{8}$$

VI. Conclusion

There are still no conclusions for this project.

APPENDIX A
TEST CASES

Test case for Systems and computing engineering undergraduate program

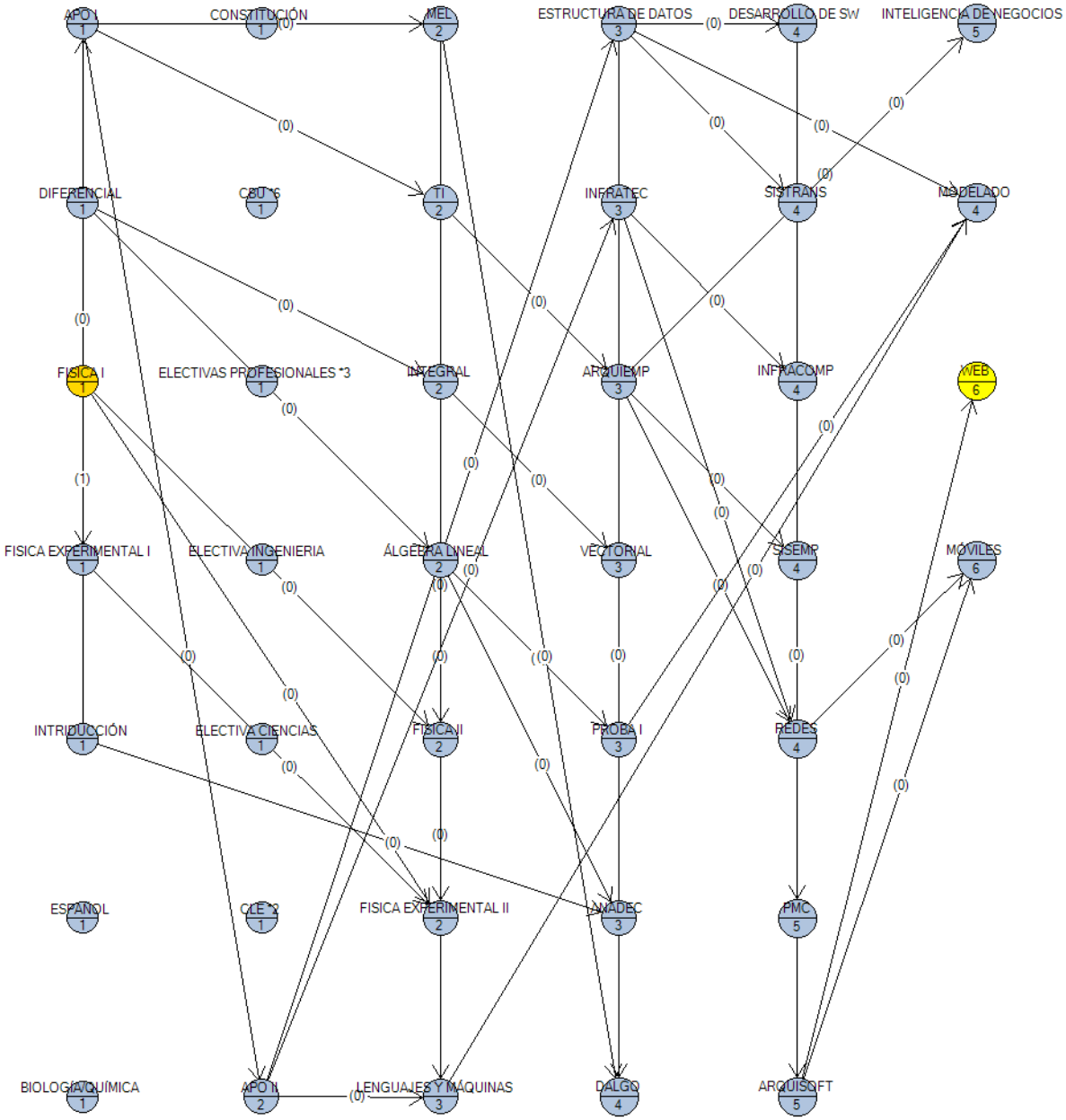

Fig. 1. Systems and computing engineering graph

Test case for Physics undergraduate program

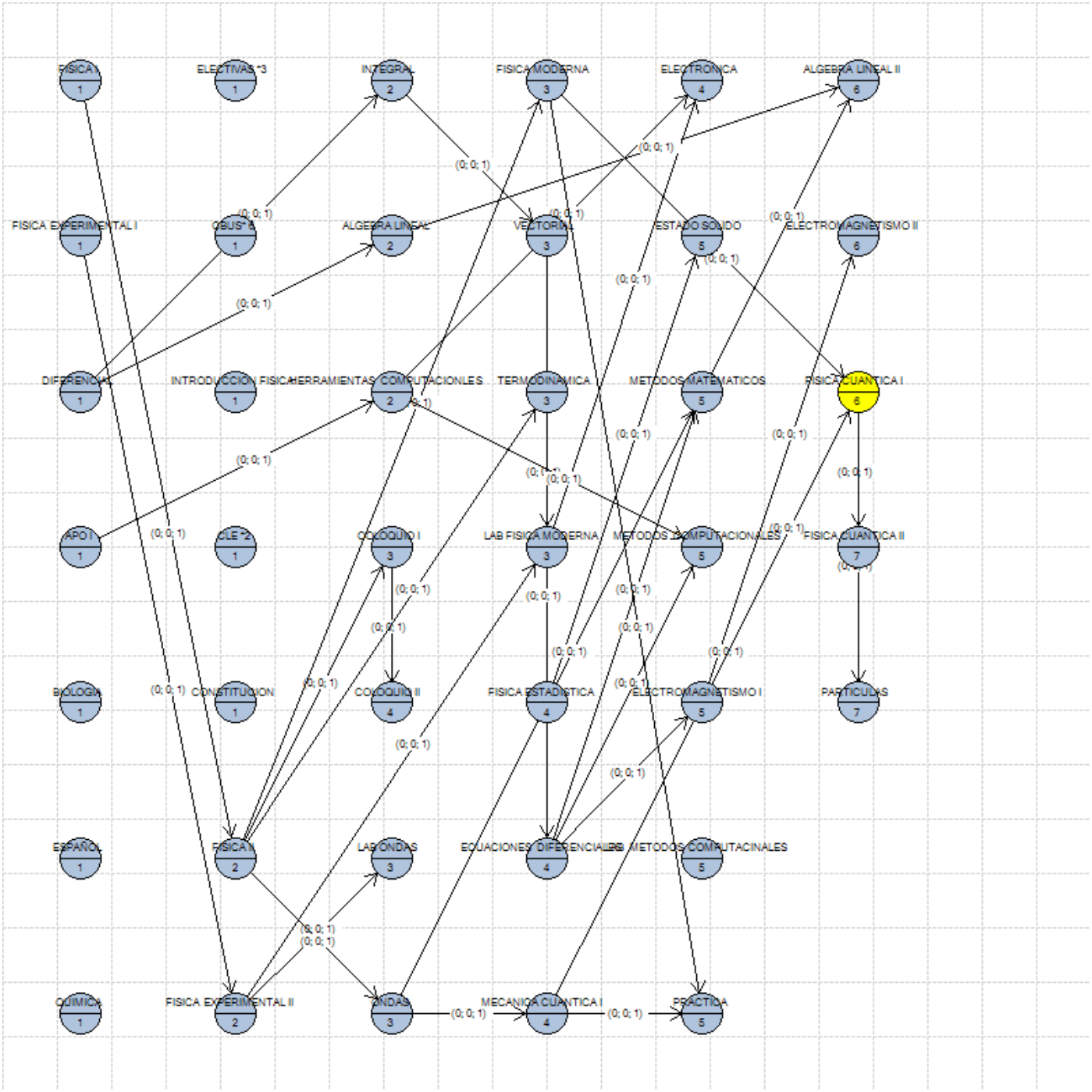

Fig. 2. Physics graph

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REFERENCES

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