A MULTI-STAGE HEURISTIC APPROACH TO UNIVERSITY COURSE SCHEDULING

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ABSTRACT

This research studies the university scheduling problem, considering the scheduling of courses (and sections of courses) at specific times, and the assignment of faculty to the different sections. It is a pilot study to model the scheduling issues faced by one of the departments in the College of Business at a CSU (California State University) campus. In general, effective scheduling can be instrumental in ensuring a smooth flow of students through the university 'system', and reducing the time to graduate (by ensuring the availability of the 'right' courses at the 'right' times). This is particularly important under the tight budget environment that many universities face. The overall research goal is to come up with a realistic modeling and solution procedure that captures the main features of the scheduling problem while being computationally tractable.

INTRODUCTION AND METHODOLOGY

The scheduling problem has been studied in the operations research literature, and due to the complexity of the problem (because it typically involves a large number of variables and constraints), solution approaches have been largely based on heuristic techniques. In our context, to make the overall scheduling problem tractable, it is approached as a multi-stage problem. The approach is as follows**:**

1. Determine the number of sections to offer for each core course (required of all business majors), based on demand estimates.
2. Schedule the non-core courses first, because they are more constrained (in terms of both available faculty as well as available times, due to course rotation considerations). This itself is done in two stages
    a. Assign faculty to courses
    b. Assign courses to time slots
3. Schedule the core courses, considering the non-core course schedules as constraints.

SUMMARY OF MODELS

To determine the number of sections for each core course, the model is based on goal programming with goals of meeting total demand as well as demand for each course, and staying within a budgeted number of sections. To assign faculty to non-core courses, and to assign courses to time slots, based on faculty preferences for courses and time slots, and the rotation schedule (designed to increase student accessibility to courses), the models are based on integer programming with binary variables.

NOTE: A literature review, list of references, and additional details can be obtained from the authors.