

# DETERMINISTIC OPERATIONS RESEARCH MODELS

MATH/CSCI 4300/8306

Fall 2020

## Project 1 – Class Scheduling with Mathematical Programming

**Due Date: Mar. 29**

### Disclaimer

I have the right to slightly modify the wording to match my intention of the description of this project. You may ask questions at any time if you do not understand the wording of the project.

### Coding Guidelines

Codes will be graded based on correctness, completeness, clarity of the code and documentation, and elegance. A perfect assignment is an elegant solution to the problem, complete with well-documented, easily understood code. A correct solution is necessary for a satisfactory grade, but incomplete solutions, sloppy code, and poor documentation will result in less than full credit. You learn by doing and working with others, not by copying. Discussing problems with fellow students is encouraged; however, when the time comes to write code, you must do your own work. You should not share your files in whole or part in any form. On the other hand, using pieces of code that you did not write, but that you understand, is permitted, with the caveat that you cite your source. In each of your assignments, you should include a header that includes such citations and a list of collaborators. Here is an example:

```
#HW3
#Sheldon Cooper
#Collaborators: Howard Wolowitz, Rajesh Koothrappali
#Resources:
#   http://beastie.cs.ua.edu/cs150/book/index_14.html
#   http://www.davekuhlman.org/python_101.html#dictionaries
```

### General Instructions

Undergraduate students must complete this project in teams of two students while graduate students must work alone. You must submit only one report per team through Canvas by Mar. 29. You must also submit your .py file(s) and spreadsheet(s) with your solutions. You must solve your project using Python and DOcplex.

## **Project Description**

Your job for this project is to make the class schedule of Fall 2021 for the Entomology Department at Mavericks University. You can find the necessary data for this project in Canvas (Data Set – Class Schedule.xlsx). Other than the data provided, you should also randomly generate a list of preferences for each professor according to their qualification. For instance, if a professor is capable of teaching a total of nine courses from those offered in Fall 2021, then each of these courses should receive a number from 1 to 9 where 1 indicates the most preferred course for this professor to teach and 9 the least preferred.

Any course at Mavericks University should start no earlier than 8:00am and end no later than 6:00pm. Courses can start only at every half hour period (e.g., 8:00am, 8:30am, 9:00am, ..., 5:00pm, 5:30pm). Each credit hour is equivalent to 50 minutes per week. Other than the obvious rules one can think about (e.g., every course must be assigned, no section can be assigned to more than one professor, course assignment must not exceed classroom capacity, etc.) you should also come up with at least two specific rules by your own. Your grade will also be based on the rules you choose to implement. All data handling should be performed through Python. No changes to the raw data in Excel are allowed. Remind that you should build your code in such a way that any other department should use your code to solve their assignment problems as long as they provide their data in the same structure.

## **Report**

You need to prepare a technical report describing your implementation and the results obtained. Standard format, margins, and appropriate grammar are expected. This report has no page limit. The technical report should include an introduction, description or statement of the problem, any relevant assumptions made, mathematical model, computer implementation and a detailed explanation of your implementation, results obtained by solving this assignment problem, and a conclusion. This document must be well-written and formatted professionally.

## **Grading**

30% to the technical report and 70% to the correctness of your implementation/solution plus the additional rules you choose to implement.