

Investigação Operacional - Mestrado Integrado em Engenharia Informática e Computação

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**Cass Study:** A Student Class Scheduling

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## A Student Class Scheduling

Kelly is a senior majoring in finance at Smith University with one more semester left to go. After a graduation audit, she was told she has five more courses she needs to take: Business Strategy (BS), International Finance (IF), one service-learning course and any two finance elective courses. A service-learning course is a requirement at the university that has a community service component. Many of the service-learning courses are offered by the Computer Information Systems Department, and Kelly would like to take one of those. In particular, two courses she finds interesting are Intergenerational Computing (IC), which involves teaching senior citizens how to use the computer, and Web Design for Non-Profit Organizations (WDNPO). After looking at the finance course offerings, she noticed four potential finance elective courses she would consider taking: Data Analysis in Finance (DAF), Risk Management (RM), Options, Futures and Swaps (OFS) and Fixed Instruments and Markets (FIM). Kelly would like to avoid morning classes because she is doing an internship that requires her to work a few hours in the morning most of the weekdays.

From the available information online, she has made a list of the courses offered and their schedule. These data are given in Table 1. All of the courses have at least two alternative schedules. Sometimes the classes are once a week for three hours, and sometimes are twice a week, alternating between one-hour and two-hour periods. Note that one "hour" at Smith University is 55 minutes long.

As she makes up her schedule, Kelly would like to keep in mind her priorities. Her priorities are first, the content of the course, second, the reputation of the instructor, and the third, the timing of the course. She decided to assign a rating between 1 and 5 to each of these dimensions. She rated the content of the course based on her interest in it, and this is a

value from 1 (poor) to 5 (extremely interested). The reputation of the instructor is also a value from 1 to 5, coming from published student comments ([www.ratemyprofessors.com](http://www.ratemyprofessors.com)) and word of mouth from classmates. The timing of the course is also a number from 1 to 5, and takes into account things such as the times that most of the senior class gets together in the Common Room to watch series such as *Glee*, *The Walking Dead*, and *Jersey Shore*.

The final rating of each alternative under consideration (consisting of a combination course/schedule) is the weighted average of the three factor ratings, and is also shown in Table 1.

Table 1 – Available Courses Data

| Course | Title                                   | Course Schedule(s)                            | Rating |
|--------|---|---|--------|
| BS     | Business Strategy                       | Monday 6h-8h45pm                              | 4.3    |
| BS     | Business Strategy                       | Tuesday 6h-8h45pm                             | 3.8    |
| BS     | Business Strategy                       | Wednesday 6h-8h45pm                           | 3.5    |
| BS     | Business Strategy                       | Friday 6h-8h45pm                              | 3.5    |
| BS     | Business Strategy                       | Monday 1h25-2h20pm &<br>Wednesday 1h25-3h15pm | 4.6    |
| BS     | Business Strategy                       | Tuesday 1h25-3h15pm &<br>Thursday 1h25-2h20pm | 2.7    |
| IF     | International Finance                   | Wednesday 6h-8h45pm                           | 3.5    |
| IF     | International Finance                   | Tuesday 1h25-3h15pm &<br>Thursday 1h25-2h20pm | 3.3    |
| IC     | Intergenerational Computing             | Wednesday 2h30-5h15pm                         | 4.4    |
| IC     | Intergenerational Computing             | Thursday 2h30-5h15pm                          | 3.1    |
| WDNPO  | Web Design for Non-profit Organizations | Tuesday 6h-8h45pm                             | 3.7    |
| WDNPO  | Web Design for Non-profit Organizations | Wednesday 2h30-5h15pm                         | 3.5    |
| DAF    | Data Analysis in Finance                | Thursday 6h-8h45pm                            | 3.0    |
| DAF    | Data Analysis in Finance                | Monday 1h25-2h20pm &<br>Wednesday 1h25-3h15pm | 3.7    |
| RM     | Risk Management                         | Monday 6h-8h45pm                              | 3.6    |
| RM     | Risk Management                         | Monday 1h25-3h15pm &<br>Wednesday 1h25-2h20pm | 3.9    |
| OFS    | Options, Futures and Swaps              | Tuesday 6h-8h45pm                             | 3.2    |
| OFS    | Options, Futures and Swaps              | Tuesday 1h25-3h15pm &<br>Thursday 1h25-2h20pm | 3.4    |
| FIM    | Fixed Instruments and Markets           | Monday 6h-8h45pm                              | 3.0    |
| FIM    | Fixed Instruments and Markets           | Wednesday 6h-8h45pm                           | 3.5    |

## Questions

1. Determine a schedule of classes for Kelly that will yield the maximum total rating.
2. Kelly heard a rumor that the management department is considering offering an online class of Business Strategy (BS) taught by Professor Dan Braun. Kelly had a good experience with Prof. Braun when she took the Introduction to Management course from him. In addition, as an online course does not have meeting times, it would not conflict with other courses. She would give such a course the rating of 5. How would Kelly's schedule change if this online course became available?
3. Kelly would like to see if she can have a schedule that requires her to attend class only three days a week. She feels such a schedule may help her allocate the time better between study and relaxation. She may consider it if this does not lower her maximum rating too much. Determine the maximum rating three-day schedule.
4. It is possible Kelly may be able to take one morning class in case her internship schedule changes. After looking at the morning class offerings, she saw that there is an Intergenerational Computing (IC) class from 9h05am to 11h50am on Tuesdays. She gives it a rating of 4.8. If she takes that Tuesday morning class, she will not want to take any class Monday evening as it will be difficult to stay until late at school and then go back early morning the next day. Also, she will not want to take any Tuesday evening courses because she does not want to be at school from early morning to late at night on Tuesdays. Given these constraints, will her optimal schedule change?