

AUTOMATED CLASS SCHEDULER

ISYS 520 – WINTER 2013

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EXECUTIVE SUMMARY

One of the most time-consuming, monotonous, and frustrating tasks that BYU students have to do each semester is figure out their class schedule for the new semester. Students must first identify the mandatory courses remaining for their major or minor, their remaining GEs, and any fun courses. Then, students have to navigate a labyrinth of drop-down menus in Route Y to find the scheduled times for each course and section. After all of these steps, students can then finally piece together a possible schedule. After organizing my schedule like this for almost four years, I decided to address the last step of this process: piecing together a potential schedule. Therefore, the automated class schedule pulls the recommended course schedule for the student's major from the Major Academic Plan (MAP), allows students to enter a list of classes they would like to take in a given semester, and then produces a potential class schedule for students. Given this use, the project is not intended for a specific organization but rather to BYU students as a whole.

IMPLEMENTATION DOCUMENTATION

CHOOSING CLASSES

In order to use the system, students must first decide on the classes they would like to take in the coming semester. To aid the student in doing this, when Excel opens it prompts the user for his or her major and the current semester. First, the student chooses a college. After choosing a college, the next combo box automatically populates with only the majors in that college. If he or she decides to choose a different college after selecting the first one, the combo box for majors resets as well (see Figure 1). This was accomplished by using the “_Change()” option of each combo box.

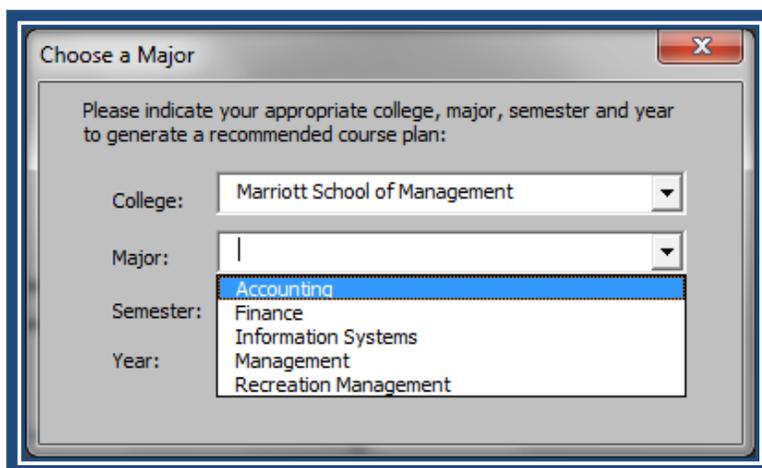


Figure 1 – Choose a Major

Once the user has chosen a college and major and clicked, “Get Classes,” Excel will open Internet Explorer and navigate to the major’s MAP to help the student choose a possible path using the appropriate recommendations from the college (see Figure 2).

Suggested Sequence of Courses**		Apply to the Accounting Program after 4th Semester. Deadline to apply is the last working day of June by 4:30 pm.	
FRESHMAN YEAR			
Semester 1 (Fall)			
First-year Writing or A Htg 100	3.0		
Bus M 180	1.0		
I Sys 100	0.5		
I Sys 102	0.5		
Rel A 121 (FWSpSu)	2.0		
General Education courses	9.0		
Total Hours	16.0		
Semester 2 (Winter)			
First-Year Writing or A Htg 100	3.0		
Econ 110	3.0		
Acc 200	3.0		
Bus M 241	3.0		
Rel A 122 (FWSpSu)	2.0		
Total Hours	14.0		
JUNIOR YEAR			
Semester 5 (Fall)			
		Acc 401 (F)	4.0
		Acc 402 (F)	4.0
		Acc 403 (F)	4.0
		Religion Elective	2.0
		Total Hours	14.0
Semester 6 (Winter)			
		Acc 404 (W)	4.0
		Acc 405 (W)	4.0
		Acc 406 (W)	4.0
		Religion Elective	2.0
		Total Hours	14.0

Figure 2 – Suggested Sequence of Courses

Once the user has decided on the courses he or she would like to take and enters them in the designated area (see Figure 3), he or she clicks on the ribbon button “Create Schedule” (see Figure 4). Before creating the schedule, a pop-up window appears so the user can verify it before pulling the data from BYU’s website.

Classes to Take Next Semester:	
Class Code	
Class 1	ACC 200
Class 2	ACC 541
Class 3	BUS M 530
Class 4	BUS M 550
Class 5	BUS M 582
Class 6	
Class 7	
Class 8	
Class 9	

Next to “Class #” in the box next to this one, please enter the class code of the classes you want to take (ie ACC 200).

Figure 3 – Enter Classes

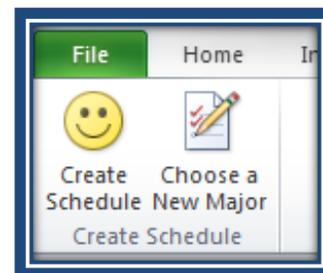


Figure 4 – Create Schedule Ribbon

After verifying the data, Excel navigates to BYU’s class timetable for the designated semester. In order to accomplish this navigation, Excel manipulates the web URL for the correct semester and course. The website’s URL is in the following format:

<https://saas.byu.edu/classSchedule/schedule.php?yearTerm=20131&dept=ACC>

In this URL the “20131” represents winter semester 2013 and “ACC” represents the class code. Therefore, Excel injects the correct semester (calculated from winter semester 2013) and class code to then import the class’s data into Excel. Once a single course’s data is imported into Excel, the general course information (class code, class name, and number of credits) is added to a class module called *course*. Each section’s unique information (section number, class time, days offered, block, room number, and professor) of that specific course is added to another

class module called *section*, which is related to that instance of the course. If there are multiple sections of a course, it will loop through all of the courses listed under that course code. Since there is occasionally text between the list of sections, the for loop that is employed to store the data uses an *IsNumeric* statement to skip lines that do not contain the necessary information.

CREATING A POTENTIAL SCHEDULE

Once Excel has imported the course information for each of the classes the user indicated initially, it uses another algorithm to create a potential schedule for the user. Starting with the first class the user listed, the algorithm goes through a range of cells labeled *calendar* by day for each section of the class by using the *days offered* attribute of the section's class module. It then checks to see if the time of the class is currently available (i.e. nothing currently in the cell). If the cell is empty, it uses the section's *credit hours* and *block* to enter in the course's code for the appropriate length of time. Note: it is important to consider if the class is a block class because, if it is, double of the amount of time needs to be blocked off for that period of time. If a class is a block class, another block class can be added at the same time if it is for another block time (i.e. block 1 and block 2 classes can be at the same time). If, however, the time of the class already has a class assigned to it, that section is not added and another section of the same course is tested. If none of the sections of the course can be added because of scheduling conflicts, it is stored and the user receives a warning after all classes have been run that the user has a scheduling conflict and may need to consider taking a different class.

After Excel has created a potential schedule, it displays the schedule to the user and also a list of classes that were not added because of scheduling conflicts (see Figures 5 and 6). At this stage, the user can (1) choose to keep the schedule created, (2) go back to the home screen and try a different set of classes from the same major, or (3) click in the ribbon on the button to choose a different major and begin the process again (see Figure 4).

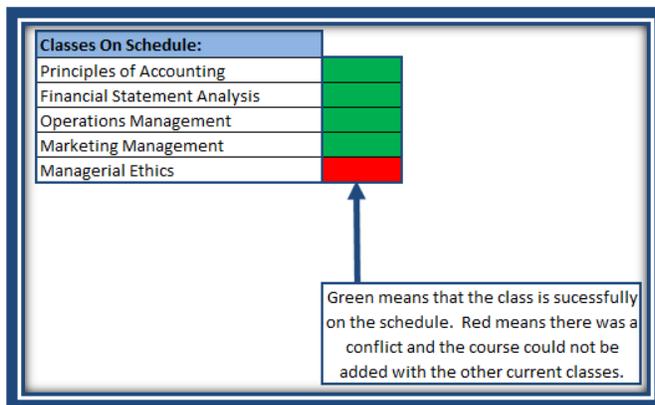


Figure 5 – Class Verification on Schedule

	Monday	Tuesday	Wednesday	Thursday	Friday
8:00 AM					
8:30 AM					
9:00 AM					
9:30 AM	BUS M 550		BUS M 550		
10:00 AM	BUS M 550		BUS M 550		
10:30 AM	BUS M 550		BUS M 550		
11:00 AM	BUS M 530		BUS M 530		
11:30 AM	BUS M 530		BUS M 530		
12:00 PM	BUS M 530		BUS M 530		
12:30 PM					
1:00 PM					
1:30 PM					
2:00 PM		ACC 541 BLK		ACC 541 BLK	
2:30 PM		ACC 541 BLK		ACC 541 BLK	
3:00 PM		ACC 541 BLK		ACC 541 BLK	
3:30 PM					
4:00 PM					
4:30 PM					
5:00 PM		ACC 200			
5:30 PM		ACC 200			
6:00 PM		ACC 200			
6:30 PM					
7:00 PM					

Figure 6 – Class Schedule

Note: See Appendices A & B for full-screen shots of the pages with which the user interacts.

DISCUSSION OF LEARNING AND CONCEPTUAL DIFFICULTIES

The first realization I came to while creating this project was that the data format Excel imports matters. For example, initially I had Excel navigate through the BYU web server by having the user sign into Route Y gathering the class information using the registration homepage. After I had this mostly working with only one small glitch, I found the BYU timetable website. Upon finding this website, I switched my project design to gather class information for the user from this website because data retrieval was quicker and required less work on the user's part. Had I done more research initially, I could have saved myself a substantial amount of time and effort.

Along a similar vein, I learned the importance of fully thinking out the project's user interface and code design before beginning to program. Twice I began the project only to realize a few hours in that I had a design flaw and the program wouldn't run as I intended. Once I sat down and thought through the project completely, I programmed much more quickly and efficiently.

One of the tools that enabled me to program more efficiently and allowed my code to run more efficiently was class modules. In previous programming languages such as Java, I had used classes to help me create object templates. When I started designing and coding my program, I had repetitive and inefficient code storing information for each class section. However, after I learned that VBA also allows classes, I taught myself how to create them and redesigned the basic structure of the class scheduler program to run more efficiently and not have repetitive information. The project employs two classes: (1) a "course" class module to hold the basic

information of a course and (2) a “section” class module that is related to a course and holds the unique information for each section of a course.

Another unique tool I learned how to create was cascading combo boxes. By cascading combo boxes I mean that if a user chooses one combo box (e.g. his or her college), the next combo box automatically populates with the information only related to the specific choice in the prior combo box (e.g. his or her major). For example, if a user chose the Marriott School of Business as his or her college, only majors within that college would appear in the next drop-down list.

ASSISTANCE

I did not receive substantial coding help from anyone on this project beyond using the agent class module to manipulate Internet Explorer. However, I met with Professor Gove to talk through potential design issues and solutions, especially on how to store the data for each section of a given course

College: Marriott School of Management		Major: Accounting	
Semester: Winter		Year: 20XX	
Classes to Take Next Semester:			
Class Code			
Class 1	ACC 200		
Class 2	ACC 541		
Class 3	BUS M 530		
Class 4	BUS M 550		
Class 5	BUS M 582		
Class 6			
Class 7			
Class 8			
Class 9			

Next to "Class #" in the box next to this one, please enter the class code of the classes you want to take (ie ACC 200).

Appendix A – Choosing Classes Form

	Monday	Tuesday	Wednesday	Thursday	Friday
8:00 AM					
8:30 AM					
9:00 AM	BUS M 550		BUS M 550		
9:30 AM	BUS M 550		BUS M 550		
10:00 AM	BUS M 550		BUS M 550		
10:30 AM	BUS M 550		BUS M 550		
11:00 AM	BUS M 530		BUS M 530		
11:30 AM	BUS M 530		BUS M 530		
12:00 PM	BUS M 530		BUS M 530		
12:30 PM					
1:00 PM					
1:30 PM					
2:00 PM		ACC 541 BLK		ACC 541 BLK	
2:30 PM		ACC 541 BLK		ACC 541 BLK	
3:00 PM		ACC 541 BLK		ACC 541 BLK	
3:30 PM					
4:00 PM					
4:30 PM					
5:00 PM		ACC 200			
5:30 PM		ACC 200			
6:00 PM		ACC 200			
6:30 PM					
7:00 PM					

Classes On Schedule:
Principles of Accounting
Financial Statement Analysis
Operations Management
Marketing Management
Managerial Ethics

Green means that the class is successfully on the schedule. Red means there was a conflict and the course could not be added with the other current classes.

