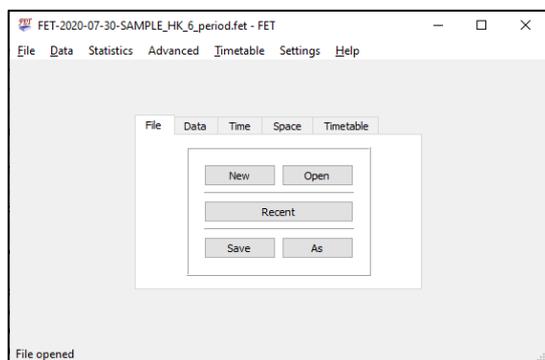

*Follow this tutorial and you can learn FET in 15 minutes
and complete a timetable in 1 or 2 days*

Section A – background information

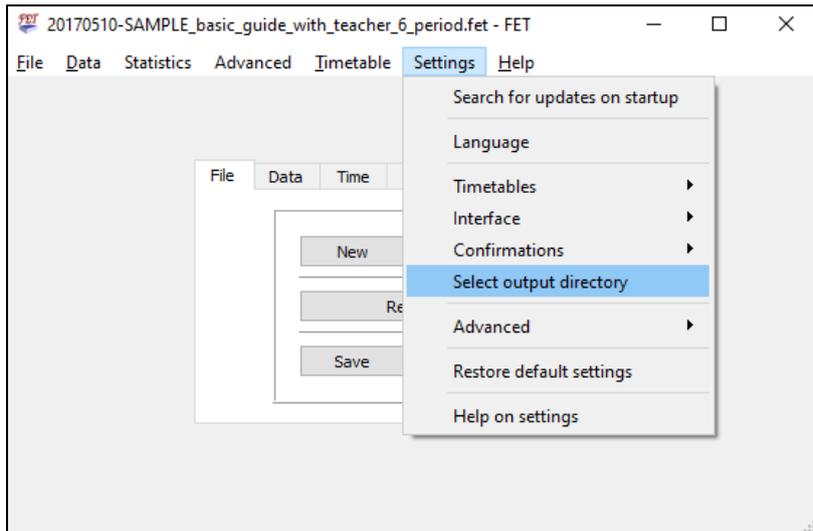
1. FET is a super powerful timetabling tool but free and open-sourced. (You saved at least 400 euro)
2. Please donate them. <https://lalescu.ro/liviu/fet/donations.html>
3. You can always get a 100% (hard/forced) constraints fulfilled timetable if there are no constraint conflicts in setup.
4. You can buy an add-on (TiTiTo) from the FET co-author, Volker Dirr, which is also powerful. <https://lalescu.ro/liviu/fet/forum/index.php?board=36.0>
5. Learn by an example would be easy. Here you are.
6. In this tutorial, we will go through some setup of the constraints. Once you read enough constraints and do one or two practices, you know how to build your own timetable. I will skip some very basic settings such as school info... etc. in this tutorial.
7. Download, install and open FET. (Get it from <https://lalescu.ro/liviu/fet/>)



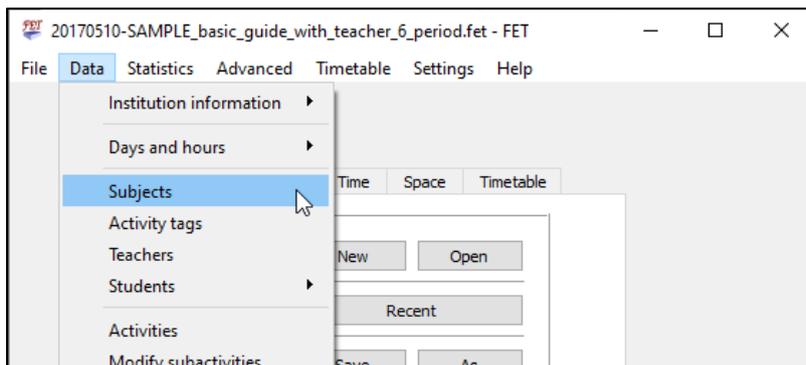
8. Open the sample project data. (replace "/" with "\" if you're using Windows)
[fet-v.v.v/examples/Hong-Kong/secondary-school-2/
FET-2020-07-30-SAMPLE_HK_6_period.fet](https://fet-v.v.v/examples/Hong-Kong/secondary-school-2/FET-2020-07-30-SAMPLE_HK_6_period.fet)
9. Constraints/Situation of the school:
 - It simulates a school in Hong Kong which runs 6-day cycle.
 - There are 8 to 9 periods each day. Depends on the classes.
 - Some senior level subjects belong to X1, X2 and X3 groups, which are elective subjects.
 - Same level with same X1/X2/X3 have their lessons at the same time.
 - The students in the whole level are split/merged and after that divided to X1/X2/X3-subject groups.
In some subjects and classes, new groups may be formed.
e.g. 1 class is split to 2 groups.
e.g. 2 classes boys and girls become 1 group boys and 1 group girls.
e.g. 3 classes in a subject are combined and after that divided to 4 groups.
 - Some subjects are in specific rooms.
 - One class period is locked on a specific time for the whole school.
 - Teachers are not allowed to have more than 6 periods in any day.
 - No cross-level lesson.
 - Some lessons occupy more than one location at the same time.
 - The constraints are rather simple comparing with many secondary schools in Hong Kong.
10. You may have different solutions for the same situation based on your school settings.

Section B – Basic setup of the school

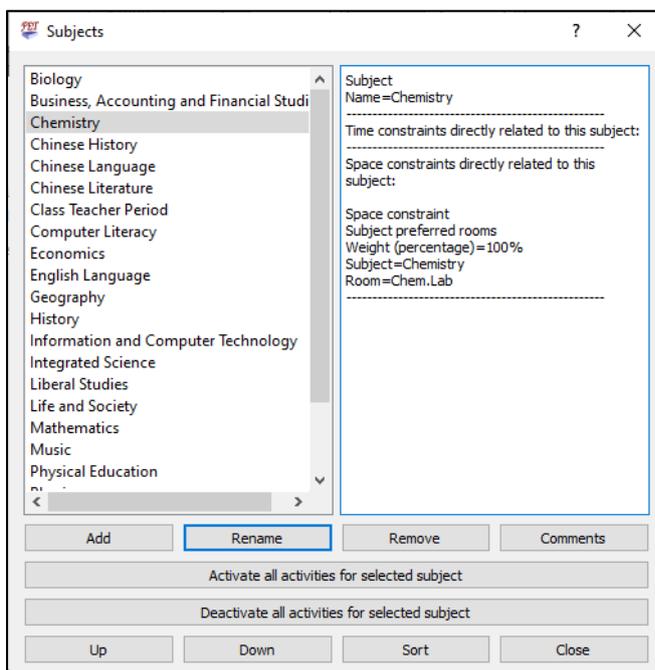
1. Set the timetable output directory to somewhere you like.



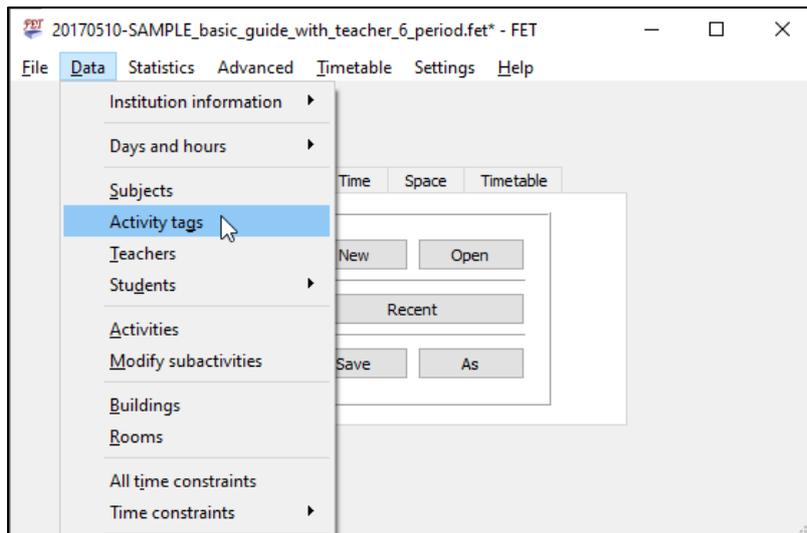
2. Go to “Data” → “Subjects”.



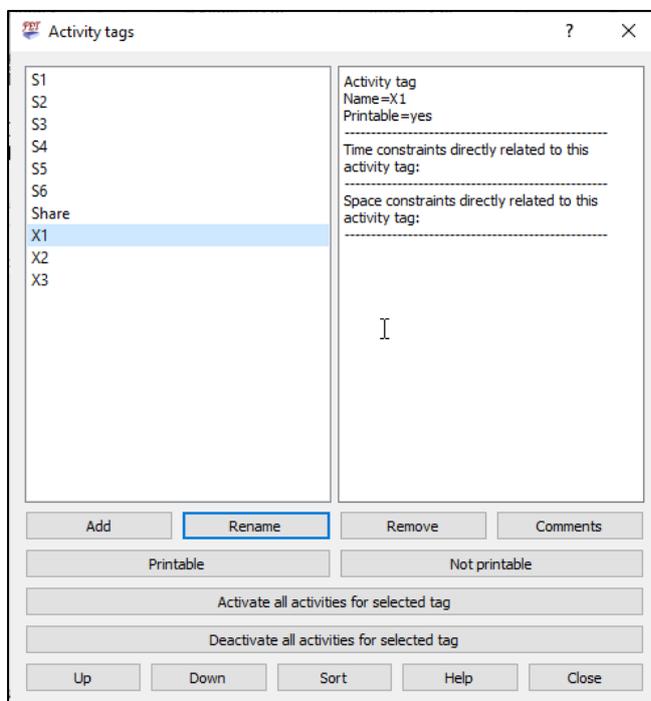
3. Look at “Chemistry” subject, the preferred room is set on the right-hand side. (Space constraints)



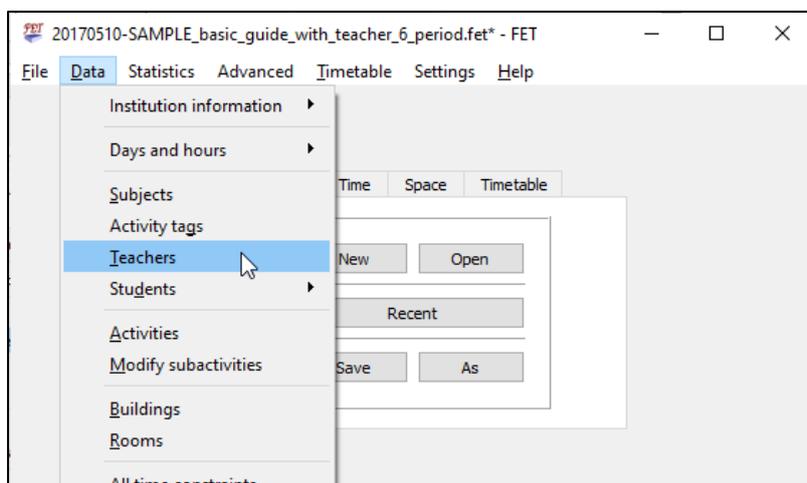
4. Go to “Data” → “Activity tags”



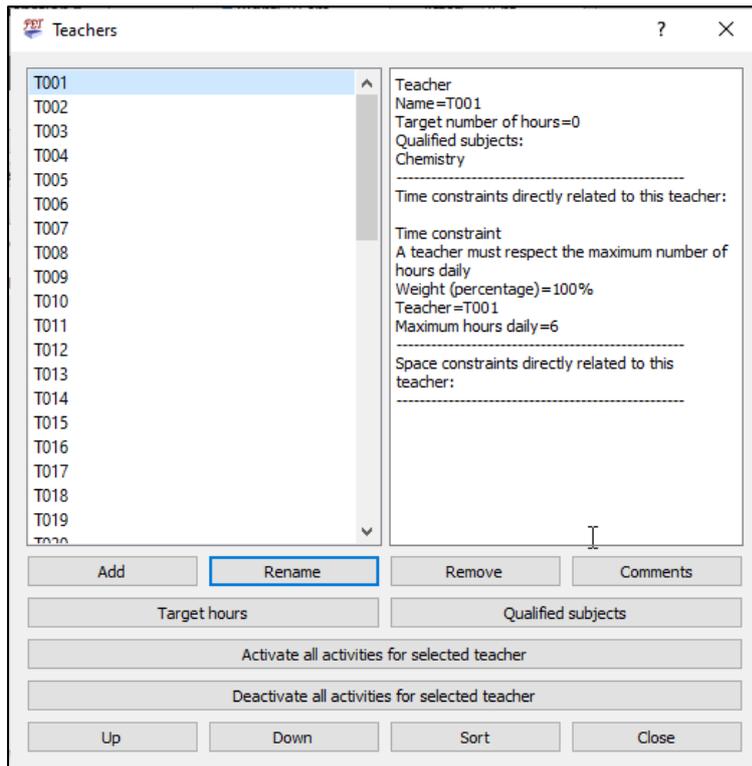
5. Some basic levels are set, the X1/X2/X3 tags are used for human-referencing.



6. Go to “Data” → “Teachers”



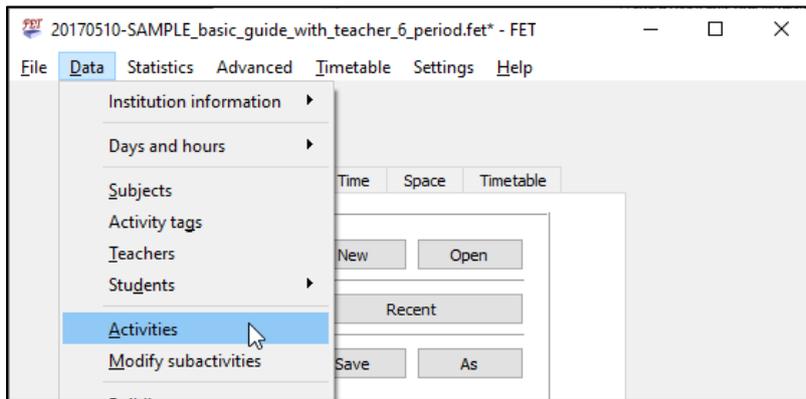
7. Subjects are set for the teachers and the constraints for teachers are set to max. 6 period each day. (1 hour = 1 period in FET)



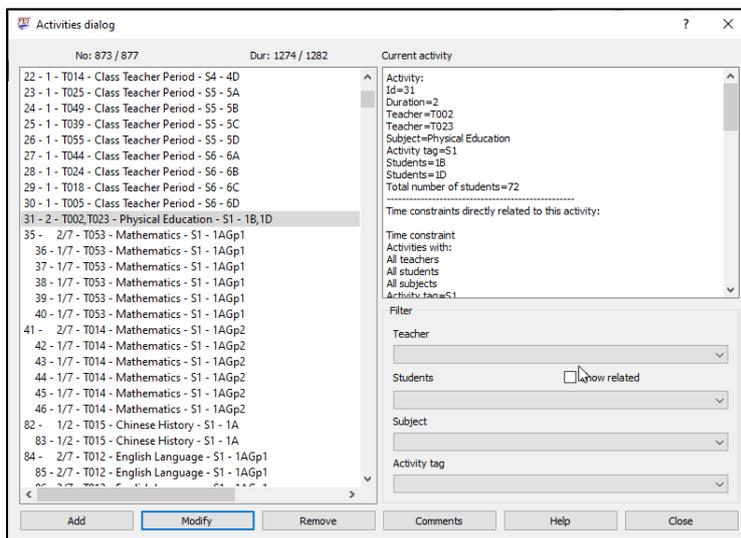
Section C – Real setup of the timetable

Example 1:

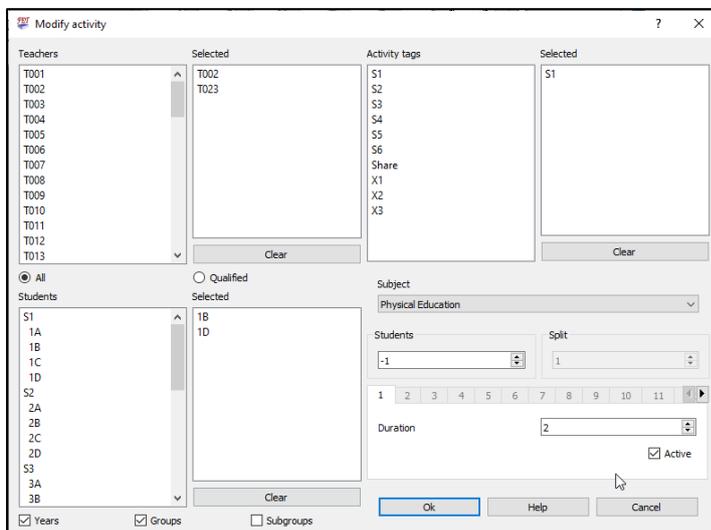
1. Go to “Data” → “Activities”



2. Item ID 31: Double click to modify/view “Item ID 31”.

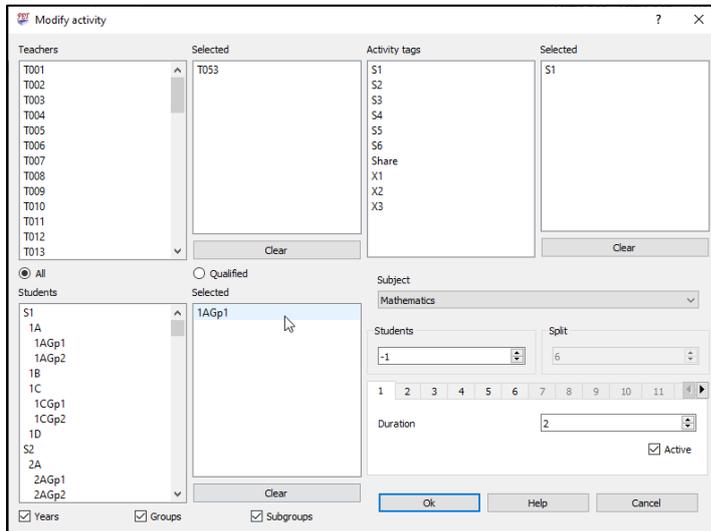


3. In this subject (Physical Education), two classes will be merged and divided to 1 boys' group and 1 girls' group. They will go to the same location for the lessons. Therefore, we just need to add both of them to the lessons.

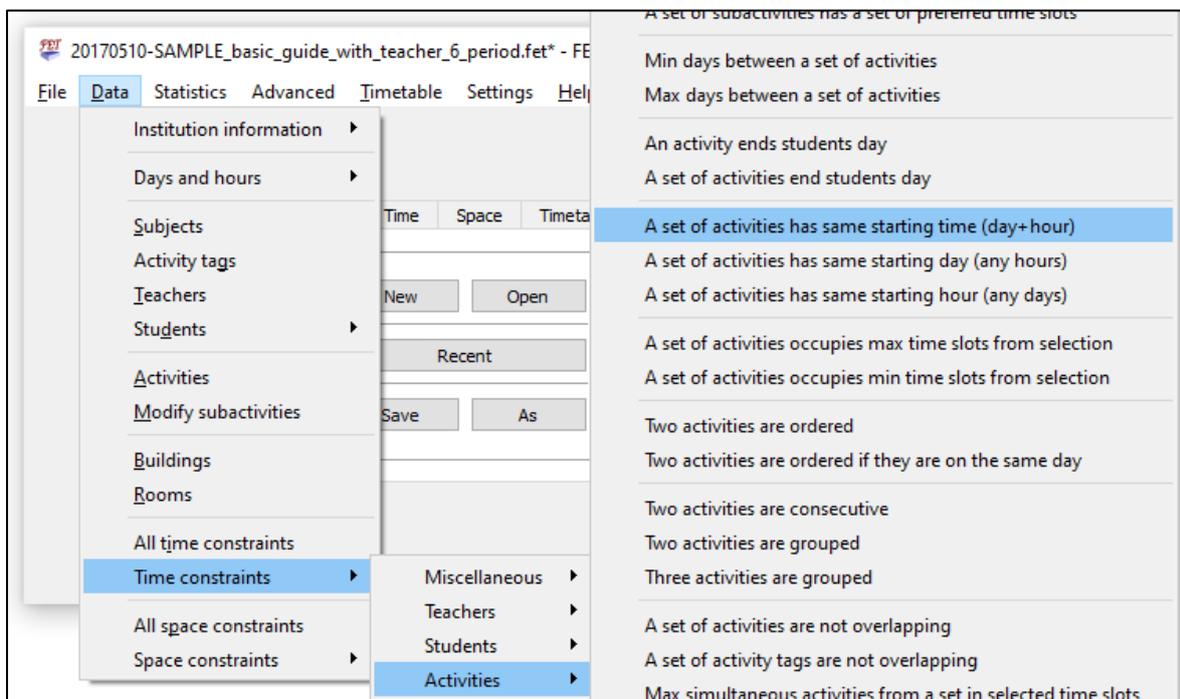


Example 2:

1. Double click to modify/view “Item id 35” or “Item id 41”.
2. 1A Mathematics lessons are divided to two groups. They have the lessons at the same time but they are taught by different teachers. Therefore, we need to prepare sub-groups for them. (I suggested that time constraints should be set immediately after we created these two classes to prevent forgetfulness while the authors of FET suggest that you make them later to reduce redundant constraints. These are different approaches. I think the main point is you need to organize and structure your work)



3. We can set it in “Data” → “Time constraints” → “Activities”
→ “A set of activities has same starting time (day+hour)”

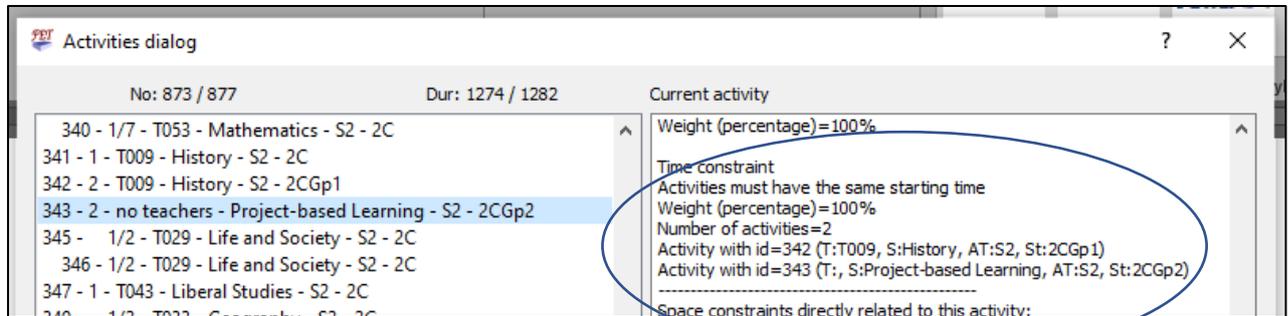


Example 3:

1. Item ID 342 and 343:

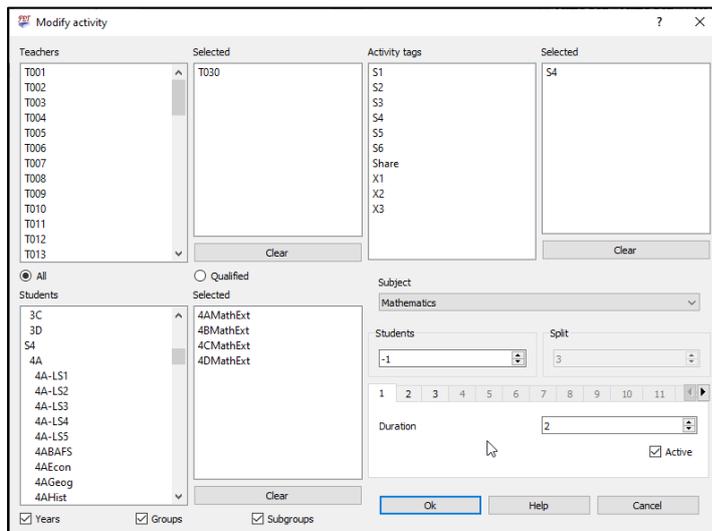
In this lesson, the teacher needs to occupy more than one location. You set the virtual lessons with no teacher but has same lesson time.

(The updated version, FET 5.40.0 released on 3 October, 2019 or above, provides the function called “Virtual rooms”. The “Virtual Room” function can handle these kinds of lessons”)



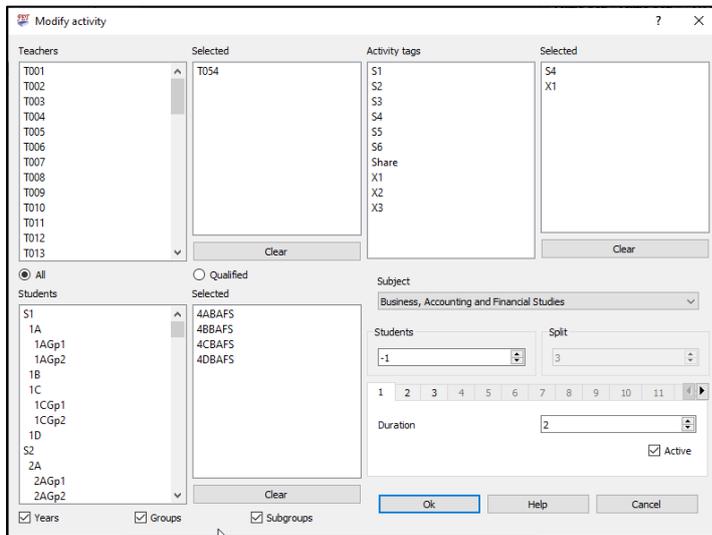
Example 4:

1. Item ID 553 to 567:
2. In S.4, 4 classes mathematics are combined and after that divided to 5 groups. We created subgroups for each class and ad the appropriate subgroups in to the settings. Set them to the same starting time.



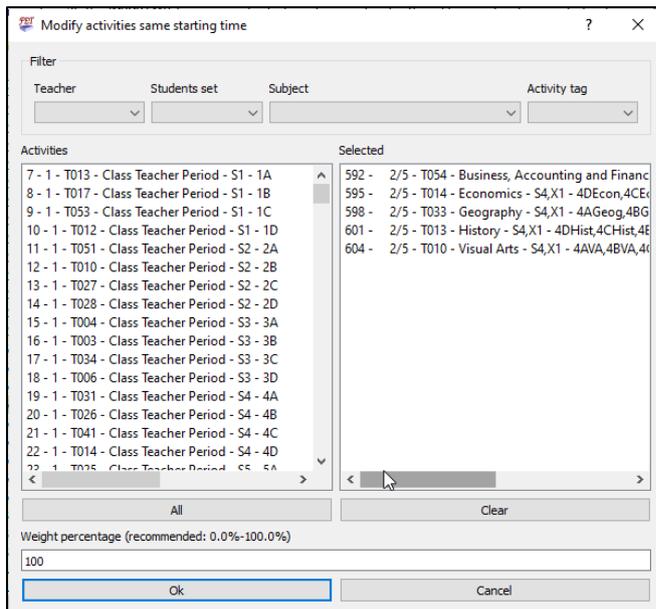
Example 5:

- Item ID 592, 595 etc.:
- They are the elective subjects in subject group X1. 4 classes are combined and after that divided into 4 groups.
Add the tags X1 for identification.



- Set their lesson time to be the same.

“Data” → “Time constraints” → “Activities”
 → “A set of activities has same starting time (day+ hour)”



Section D – Organize, structure and distribute your work

Making timetables with bad tools is a nightmare. Many teachers who are responsible for this in each summer know this. Meanwhile, if your tool can just output a 97%-completed timetable is just rubbish. (Many teachers in Hong Kong are using this kind of 30-year old tool.) In such case, you can either limit your constraints or use a better tool (FET).

Technically, if you have a good tool with a good system, you can let anyone of your colleagues to complete this kind of work. Here are some ideas about structuring the system.

Some of you have a tradition idea that this task can only be completed by one to two “hi-tech”/trained people but it’s not.

Making timetable(s) involves few phrases:

Phrase No.	Content	Responsible person	Remarks
1	Collect requirements/constraints from colleagues.	Managers	So, as you can see, if the constraints options provided for colleagues’ selections are already translated, you don’t need to put too much efforts in mix and match.
2	Translate the requirements/constraints to corresponding settings in the application (in paper).	Anyone (*)	
2a	Distribution of lessons of each subject in each level		
2b	Teachers for each subject and class		
2c	Locations of each subject and class		
2d	Teachers’ constraints		
2e	Time constraints		
2f	Locations constraints		
2g	Some others		
3	Prepare documents for input FET.	Trained person	If the document is highly guided for the phrase 4, the choices for the responsible people would be highly flexible.
4	Input data into the FET, which includes:		
4a	Input school basic settings	Anyone (*)	
4b	Input teachers, classes and groups	Anyone (*)	
4c	Input lessons data (activities)	Anyone (*)	
4d	Input constraints (time/teachers/location etc.)	Trained person (*)	
5	Output timetable(s)	Anyone (*)	
6	Verification and confirmation	Principal	

(*) If your document is clear enough and highly correlated to the FET constraints, colleagues can select the appropriate options when they are filling in the lessons-constraints forms. In case the constraints are provided by the managers directly, you can suggest/provide them a designed form to reduce their and your workload. Once the forms are standardized, you just need to translate those special needs to FET constraints. Therefore, some highly specialist-dependent processes can be distributed to those non-trained colleagues or even clerks.

Check this out, using CSV: <https://www.youtube.com/watch?v=gBpkXoHjVk0>

	A	B	C	D	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Subject	No. of periods	Class-Group	No. of distribution	Dis.2	Dis.3	Dis.4	Dis.5	Dis.6	Dis.7	A Teacher	B Teacher	C Teacher	D Teacher	Room A	Room B	Constraints
2	Chinese Language	7	C->2	4	2	2	1				T001				Home	2/F	at least 2 double
3	English Language	9	A->Gp1,Gp2	4+1(Special)	2	2	1	2		(Optional)	T002	T004			Home	2/F	at least 2 double
4	Mathematics	7	A->Gp1,Gp2	6	1	1	1	1	1		T003	T005			Home	2/F	at least 1 double
5	Chinese History	2	X	2	1						T006						
6	History	2	X	2	1						T007						
7	PTH	2	X	2	1						T008						
8	Music	2	X	2	1						T009			Music Room			
9	Visual Arts	2	X	1							T010			VA Room			
10	Computer Literacy	2	X	1							T011			CP1			Double
11	Liberal Studies	1	X	1							T012						
12	Geography	2	X	1	1						T013						
13	Integrated Science	4	X	2	2						T014			IS Lab			all double
14	Physical Education	1	X	1							T015/T022			Playground			double
15	Class Teacher Period	1	X	1							T016						Day 6 #6
16	Life & Society	2	X	2	1						T017						
17																	
18	Total	46															

Section E – Possible schedule

Definitely you may need one or two more hours to familiar this software just like any other timetabling software, but the algorithm of FET makes it possible to output 100%-completed timetables.

(Well if your constraints have conflicts, no software can make it for you.)

Now, let's talk about how you can complete the task in 1 or 2 days.

Day 1:

Once you receive the documents and requirements from school management team, you or/and your team member may need to do the following tasks:

Task	Content	Time required
1	Translate the requirements to fit the FET.	1~4 hours, depends on the document design. (Section D)
2	Input the data into a spreadsheet file (LibreOffice Calc/ Microsoft Excel/ Google Sheet).	1~2 hours, depends on the document design. (Section D)
3	Summarize the constraints and check to see if there are any conflicts and redundancy	1 hour
4	Convert the spreadsheet files to few csv files for importing to FET.	1 hour, the design of the spreadsheet file should be similar/fit the csv files.
5	Import the csv files into FET.	15 minutes

(*) You may also enter the data by GUI especially in the first few times of use. Trial run your csv before you use it in yearly task.

Day 2:

Task	Content	Time required
6	Input and check all constraints (debug) by generating timetable periodically	2 ~ 4 hours, depends on the complexity.
7a	Generate multiple timetable(s). (*)	1 hour
7b	Soften some conflicts if necessary	30 minutes
7c	Generate multiple timetable(s) again. (*)	1 hour
8	Send to school representative for verification and confirmation (Choose one, or modify constraints).	30 minutes
9	Polish the chosen timetable.	30 minutes
9i	You may modify the xml/css if you have such skills.	
9ii	You may use the "FET-timetable-to-Excel" tool to convert the timetable to Excel file. Combine some worksheets in the file, especially those divided classes.	

(*) Tips from the author: you may open multiple FET running the same project file to generate multiple timetable(s). One more thread/CPU core will be used for each new FET window opened.

As you can see, we need to spend some time on organizing/translating the documents. If you can simplify this process, you can save everyone's time and complete the task in only 1 day.

If your school situation is similar to the sample school, you may only need 15 minutes allowance for each timetable generation. Increase the time allowance when the complexity increase.

A 99.x% timetable should be abandoned. If you complete the 99.x% timetable manually by softening the constraints, you would better soften those constraints in FET. Some teachers would like to challenge this game and spend 1 to 2 weeks every year. It may be funny if you have no other aims or goals.

Section F – Some suggestions

The major problematic constraints and handling methods were introduced above. The other constraints/time constraints can be handled by the menu provided. Most of the items are self-explained. Check those out once before you start your work.

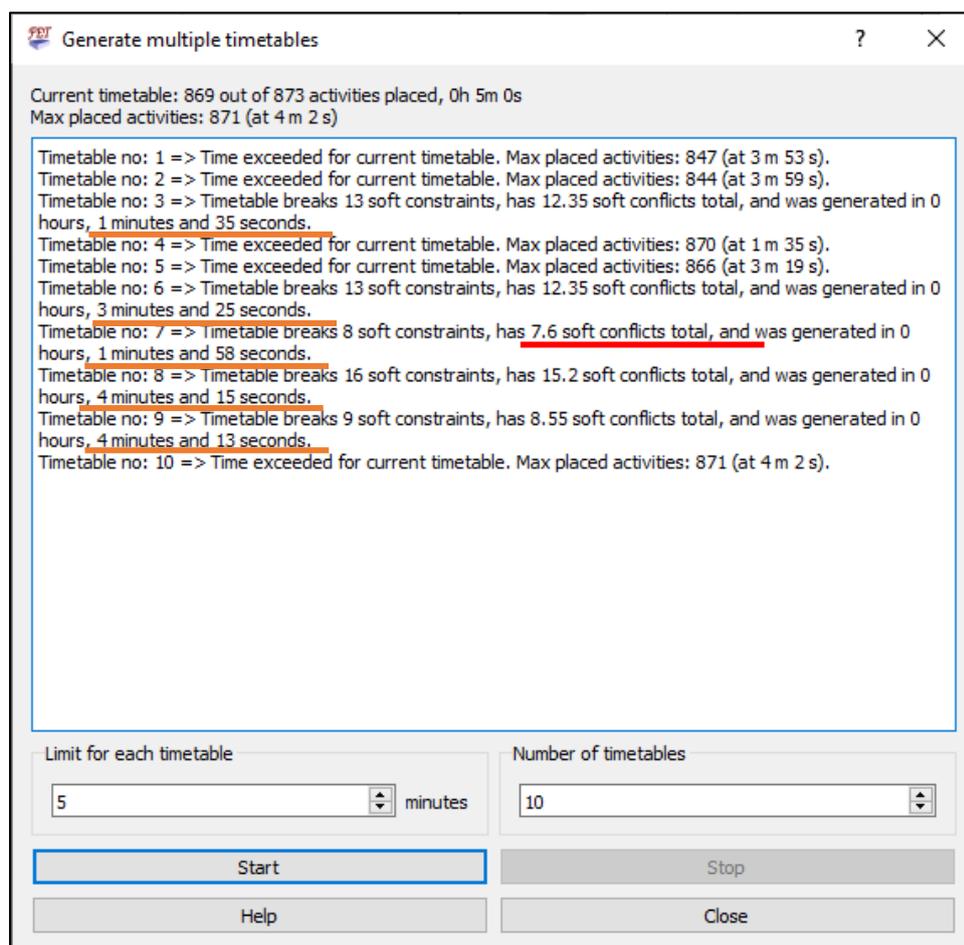
Remember to prepare your school documents and confirm the school requirements before you start marking the timetable. You may try to provide your colleagues some “constraints template/options” for easier work in the future.

Setup your timetable class by class, level by level. Organize your setup process so that you can maintain it easily. Do not forget to set the constraints.

It may be a good practice to add and set those paired lessons/subjects/classes at once to prevent any missing items.

(You may see there are some tags and groups not being used in the sample file.

It's normal when you found some of them can be replaced. **Check** Item ID: 604, 607, 791 and 799)



I often use the “Generate multiple timetables” function, limited the time to 10 to 15 minutes, to generate 10 reports. Therefore, I can get the “best” timetable(s) with least soft conflicts.

My Jan-2014 AMD-A10 laptop can generate this sample within 5 minutes with 100% (hard/forced) constraints fulfilled if I got a lucky seed/random number.

(It seems like that the version 5.45.1 is much faster than the 5.31.6. It takes about 8 minutes on average to generate a successful result in version 5.30.7 but only 2~5 minutes in version 5.45.1.)

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2020-08-01