



# Untis

## Course Scheduling



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# 1 Introduction

## A few words on the use of the word 'student'

The word student used in Untis' program interface always includes the pupils of a school or the students of a university (of applied sciences) or any other facility of education. Whenever it is possible and readability is not impaired we use both genders. In the program interface – to which we refer in this manual many times - it is not possible to consider both genders due to lack of space and translatability. Therefore we explicitly want to state that the terms *student* , *pupil* and *teacher* unfailingly refer to both men and women. Many school systems offer students (pupils) the possibility of choosing at least some of their subjects in order to take individual students' interests and talents into account.

The concept of *class* no longer applies in certain areas and different student groups can be put together differently for different subjects. Traditional class-based teaching where all students in a class have the same lessons at all times is no longer a prime concern.

The timetable for the class as a whole thus has less significance for the individual student. When setting up timetables, more attention has to be paid to the course choices of each student, and each student consequently needs his/her own schedule.

## Students timetables

The [Students timetables](#) module extends the basic functionality of Untis, making it possible to create an individual schedule for each student.

It allows you to administer [student master data](#) , convert lessons to [courses](#) for student selection, define [course choices](#) of individual students and also to enter which course should if possible take place simultaneously (course bands or [clusters](#) ).

With the students timetables module, automatic [timetable optimisation](#) and timetable diagnosis take course choices into account and attempt to optimise individual [student timetables](#) .

The students timetables module is ideal for school systems that have a large measure of class-related lessons but which also offer a number of optional courses.

## Course scheduling

The limitations of the functionality of the students timetables module can be seen when several similar [parallel courses](#) are held for a particular subject and a decision has to be made as to which of these parallel courses a student should take, or when the range of optional courses is so large that it must first be determined which courses should best be held concurrently because they have no shared students.

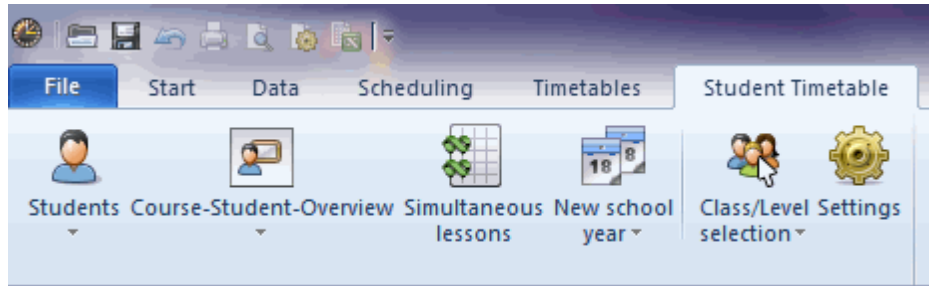
The course scheduling module is intended to help you with these advanced tasks. The two main tasks of course scheduling are to determine which courses should best be taught at the same time (creation of [course clusters](#) ) and to allocate students to actual courses when a subject is offered in several [alternative courses](#) .

The course scheduling module, with the [exam scheduling](#) function, also offers the possibility of scheduling tests and coordinating the resultant changes to the timetable.

The course scheduling module is based on the students timetables module, and so the license for former includes the license for the latter.

## 2 Students timetables

You will find the additional functions for working with students and courses under menu item "Modules | Students timetables".



- [Course-Student-Overview](#)
- [Students](#)
- [Simultaneous lessons](#)
- [New school year](#)
- [Class/Level selection](#)

### 2.1 Workflow for completed student timetable

1. Create (or import) appropriate [master data for each student](#) required for student timetable creation
2. Convert those lessons into courses which need to be available for the students' [course options](#)
3. Define the course options for each student in the [course-student-overview](#) (allocation of courses)
4. Define simultaneous courses in [course clusters](#) (bands)
5. Create the timetable with the help of automatic [timetable optimisation](#) or [manual scheduling](#)
6. Analyse the timetable of each student with the timetable diagnosis function
7. Display and print [student timetables](#)

### 2.2 Student master data

You can open the input window for student master data via the <Students> button on the *Course scheduling* tab.

Name	Surname	First name	Number	Class	Male	Female
Oban	Oban		S12001	12	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Talisker	Talisker		S12002	12	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Lagavulin	Lagavulin		S12003	12	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Laphroaig	Laphroaig		S12004	12	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Scapa	Scapa		S12005	12	<input type="checkbox"/>	<input checked="" type="checkbox"/>
GlenOrd	GlenOrd		S12006	12	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Clynelish	Clynelish		S12007	12	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Bladnoch	Bladnoch		S12008	12	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Fettercairn	Fettercairn		S12009	12	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Student form fields:

- Students first name: [ ]
- Student registration number: S12001
- Class of the student: [ ]
- Date of birth: [ ]
- Optimisation code: [ ]
- Classes with class group: [ ]
- E-Mail address: [ ]
- Male:  Female:

This is where you enter the details of all students who may choose courses. The meaning of many of the fields match that of corresponding fields in other Untis master data elements or are self-explanatory. If necessary, please refer to the "Untis User Manual" for information on entering data.

#### **Warning: Assigning students to classes**

Each student must be allocated to a class since a student may only choose courses allocated to that class. It is sufficient to enter the name and class of a student in order to allocate course options and create student timetables.

#### **Optimisation codes**

In addition to the general student data fields there is an additional "optimisation code" input field for course scheduling. Please refer to the chapter [Student](#) in the [Course scheduling](#) segment for more detailed information of this function.

#### **Class groups**

If you use so-called class groups to organise your lessons (please also refer to chapter ' Class

groups ' in the 'Untis User Manual'), you can allocate, via the master date field 'Classes with class group', each student the differentiation group(s) he/she chose .  
This makes it possible to create an individual [timetable](#) for each student.

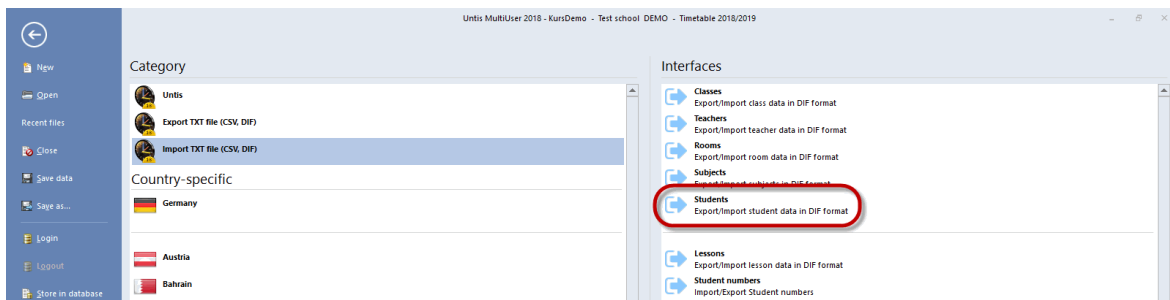
### Tip: Years/grades

If your school system has no (real) classes, we recommend combining a school year to form a class (e.g. YR12) or simply creating one class and assigning all your students to this class.

## 2.2.1 Import

The required information on students often exists in electronic form. In such cases this data can usually be imported into Untis..

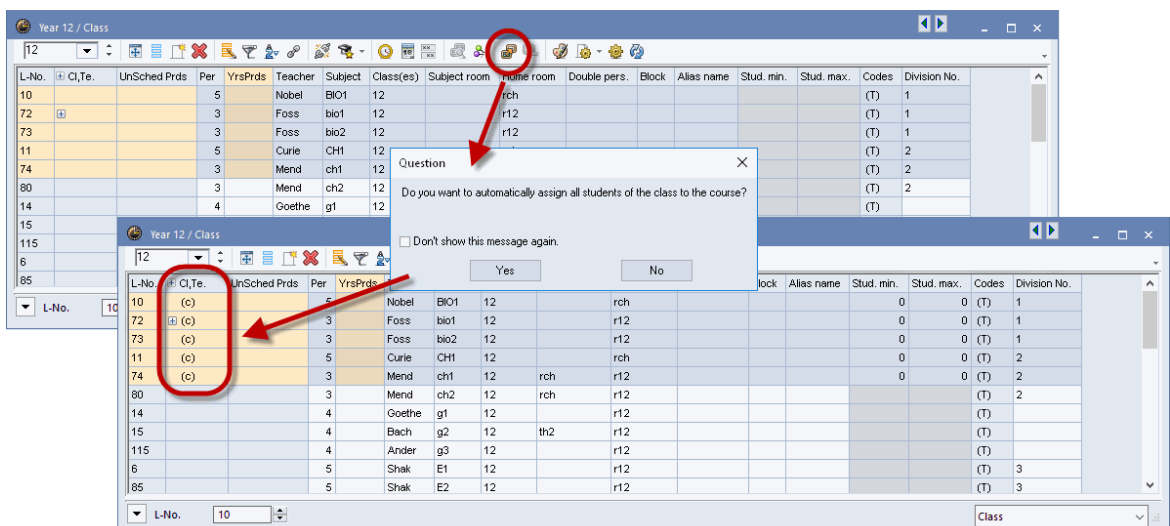
It is easiest if there already is a special interface to the other application, but even the standard import interface (File | Import / Export | Import DIF file | Students) allows data to be easily transferred.



## 2.3 Specifying courses

A course is a lesson that does not need be taken by all students in the class(es) allocated, but can be chosen by individual students. Regular lessons of a class are therefore compulsory lessons for all students of a class, the courses need to be selected by the students explicitly.

In order to convert lessons into courses, the desired lessons must be selected (by highlighting them with the mouse) and then clicking on the <Convert lesson(s) into course(s)> in the toolbar of a lessons view.





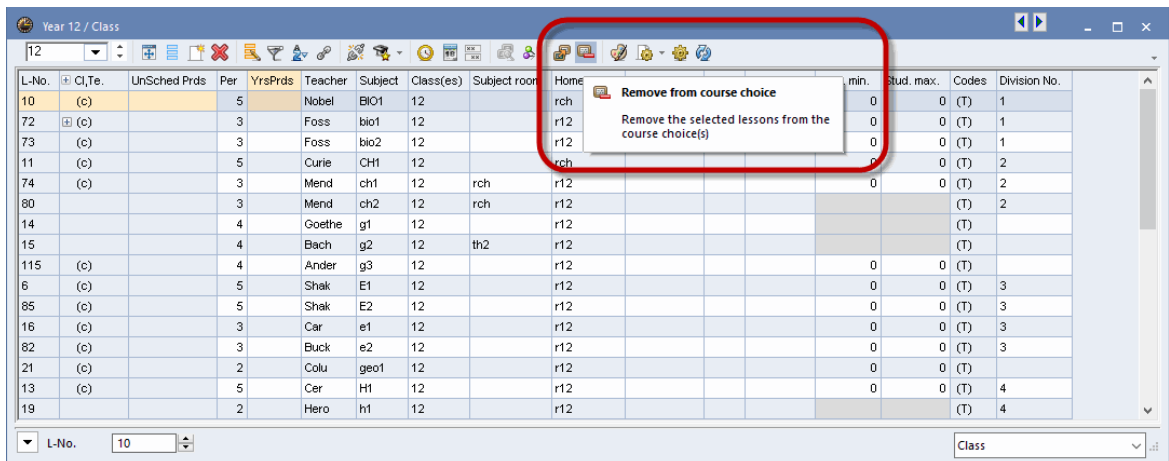
In some cases it is easier to just remove individual students from a course than allocating the majority of a class to a course. Therefore converting a lesson into courses always raises the question if all students (of the classes involved) should be allocated to the course. By clicking 'No', no students are initially allocated to the course.

A (c) is displayed in the "Cl,Te" column of a lessons view to indicate that a lesson has been converted into a course.

**Warning: Unique subject name**

If there are several courses allowed for a class, each of these courses should be given a unique subject name in order to make them easier to identify. For this reason, the course demo file contains e.g. two lessons for year 12 with the subject names bio1 and bio2 instead of both lessons having the subject name bio.

If you want to re-convert courses into regular lessons click on the <Remove from course choice>button.



**2.3.1 No lesson couplings**

We recommend that you create a separate lesson for each course and that you do not use courses to form lesson couplingse. Instead of lesson couplings, you should use [course clusters](#) (bands), which are described later. This makes it possible that a course can be held simultaneously for the same classes if the students participating in them are different.

**Note: No course without a class**

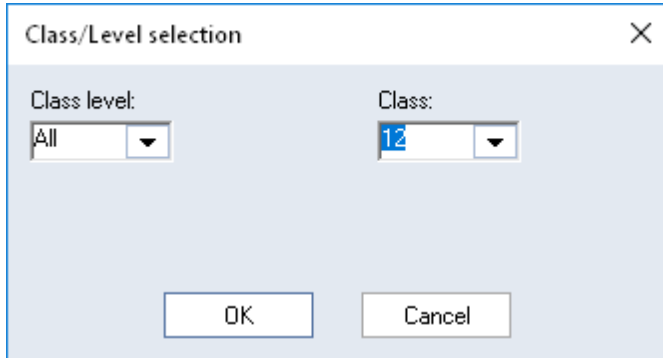
Lessons without class(es) cannot be converted to courses.

Students can only choose lessons that are allowed for their class. If a lesson can be chosen by students from different classes, simply specify all these classes in the lesson.

## 2.4 Class/Level selection

You can define which class or which class level should be preselected when the course-student overview is opened by clicking on the 'Course scheduling' (or 'Student timetable') tab and then on < [Class/Level selection](#) >.

This is very useful when work relates to a particular class or year/level.



## 2.5 Course-student overview

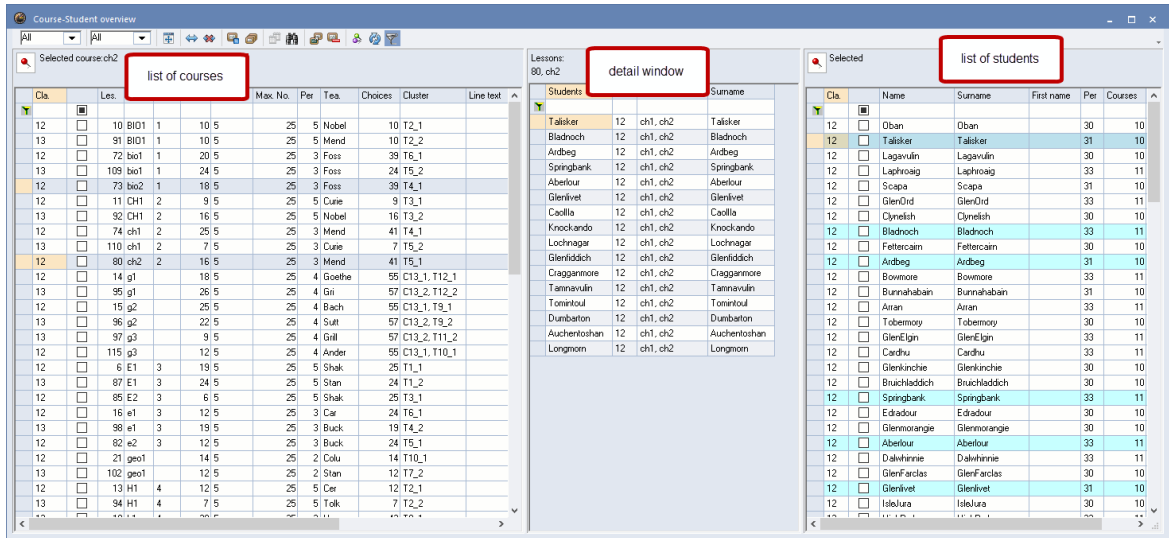
The course-student overview provides you with a summary of which [courses](#) are being taken by which [students](#) and is also used to [allocate courses](#) to students and students to courses.

The window consists of three parts:

1. On the left is the [course window](#) with a list of possible courses.
2. On the right is the [student window](#) with a list of students.
3. The [detail window](#) in the centre shows either the courses for a student (when the focus is on a student) or the students in a course (when the focus is on a course).

### Note: Clipboard

The contents of the student list can be copied to the Windows clipboard by selecting the desired rows and executing the command 'Edit | Copy' (or by pressing CTRL+C).



**Note: Course-student-overview and course scheduling**  
 The [course scheduling](#) module also extends the functionality of the course-student overview. Some of the following figures may differ from your system version if you use the course scheduling module. You can find a more detailed description of the extended functions of the course scheduling module in chapter 'Course scheduling' under '[Data input](#)'.

### 2.5.1 Course window

The course window of the [course-student-overview](#) displays a list of all courses of the selected class or class level/year..

You can right-click with the mouse to display or hide the following columns:

<input checked="" type="checkbox"/>	Class
<input checked="" type="checkbox"/>	Marked
<input checked="" type="checkbox"/>	Lessons
<input checked="" type="checkbox"/>	Subject
<input checked="" type="checkbox"/>	Division number
<input checked="" type="checkbox"/>	Number Students
<input checked="" type="checkbox"/>	Min. No.
<input checked="" type="checkbox"/>	Max. No.
<input checked="" type="checkbox"/>	Periods/week
<input checked="" type="checkbox"/>	Teacher
<input checked="" type="checkbox"/>	Choices
<input checked="" type="checkbox"/>	Cluster
<input checked="" type="checkbox"/>	Line text
<input checked="" type="checkbox"/>	Line text-2
<input checked="" type="checkbox"/>	Student group
<input checked="" type="checkbox"/>	Assi.Les.Grp
<input checked="" type="checkbox"/>	Eff. time range
<input type="checkbox"/>	Filter

**'Cla.'**

**Class(es) for which the course is held (e.g.**

**12**

**)**

**Marking box**

**To permanently mark a course**

**'Les.'**

**Lesson number (e.g.12 or 19)**

**'Subj.'**

**Subject (e.g. bio or M1)**

**'DNo.'**

**The division number is entered under '**

**Classes**

**|**

**Lessons**

**' and indicates lessons that are taken by different groups in the class. A student may only be assigned one lesson from a group of lessons/courses with the same division number. For example, the mathematics courses**

**M1**

**,**

**m1**

**and**

**m2**

**for class**

**13**

**all share the division number**

**5**

**. Each student may therefore only choose one of these courses.**

**Note: Division numbers**

If the division numbers of the classes taking part in a lesson are different, the relevant division numbers are indicated in the sequence of the classes. Otherwise a division number is indicated only once.

**'Stud.'**

Shows the total number of students who have chosen the course (irrespective of the class or class level selected).

**'Min. No.' 'Max No.'**

These fields are only shown in the course scheduling module.

Here you can define the minimum and maximum number of students permitted for the relevant course. This entry is important in combination with [Course optimisation](#)

.

**'Per'**

Course periods per week

**'Tea.'**

Teacher giving this course.

**Choices**

Number of course choices where the course is displayed. This field is only shown in the course scheduling module.

**'Cluster'**

Shows the name of the cluster (band) that the course belongs to. Please refer to section '[Simultaneous courses \(clusters\)](#)' for more information.

.

**Line text / Line text 2**

Any texts you want to add to the course.

**Student group**

The student group allocated to this course.

**Assi.Les.Grp**

The lesson group allocated to this course (only when you use Multiweek timetable module)

**Eff. time range**

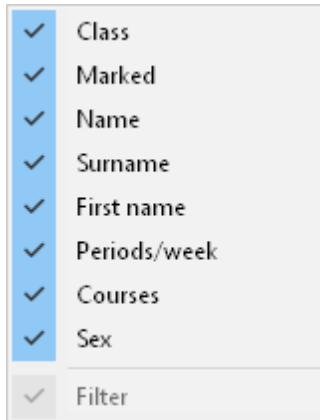
The time range of the school year in which the course can take place.

When you select a course by clicking on it with the mouse, the row in question is displayed dark blue. This course is now the active course. All students of the active course will be listed in the [detail window](#) and also highlighted light blue in the [student window](#).

## 2.5.2 Student window

The student window of the [course-student-overview](#) displays a list of all students of the selected class or class level/year.

The following columns can be displayed for each student:



**Cla.**  
**'Cla.'** Class of the student

**Mark box**  
 To permanently mark a student (please also refer to '[Assignment using element marking](#)  
 ')

**'Name'**  
**Student short name**

**'Surname'**  
**Student long name**

**'First name'**  
**Student first name**

**'Per.'**  
**Weekly periods for the student (irrespective of the class or class level/year selected)**

**'Courses'**  
**Number of courses chosen by the student (irrespective of the class or class level/year selected).**

**'Sex'**  
**Student's sex**

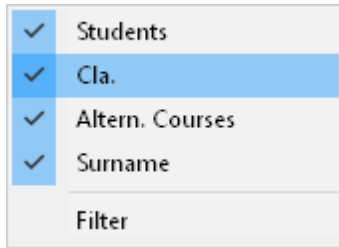
When you select a student by clicking on him/her with the mouse, the row in question is displayed in grey. This is now the current student and all courses he/she has chosen will be displayed in the detail window and as well as in the course window highlighted in light blue.

### 2.5.3 Detail window

The contents of the detail window of the [course-student-overview](#) depends on whether the [course window](#) or the [student window](#) currently has the focus (i.e. in which of these two windows you last clicked the mouse).

#### Course window active

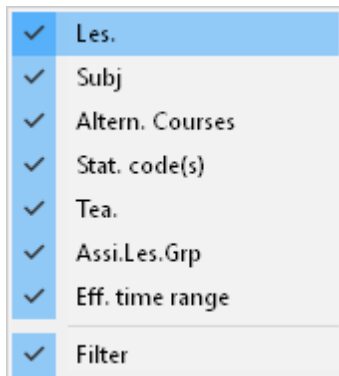
If the focus is on the course window, the detail window will display the students of the active course with the following columns:

**Student****Student short name****Cla.****Class of the student****Altern. courses**

This field is displayed for information purposes only for the students timetables module and shows possible alternative courses that the student can choose. The data in this field was entered with the course scheduling module.

**Surname****Student long name****Student window active**

If the focus is on the student window, the detail window will display the courses chosen by the active student with the following columns:

**Les.****Lesson number of the course****Subj.****Subject of the course****Altern. courses**

This field is displayed for information purposes only for the students timetables module and shows possible alternative courses that the student can choose.

**Stat.****Statistics code of the Student- Course-Choice (only active in course scheduling module).**

**Tea.**

**Teacher giving this course**

**Assi.Les.Group**

**The lesson group allocated to the respective course.**

**Eff. time range**

**The time range of the school year in which the course takes place.**

### **Student details window (magnifier)**

The detail window can serve as a 'magnifier' in a similar way as other windows such as master data views, timetables or scheduling dialog.

If you click on a student in another window, the detail window will display the courses for the student concerned.

If you click on a lesson in another window, the detail window will display the students for the lesson concerned.

## **2.5.4 Course assignment**

Specifying the course options of a student is called course assignment. You can either assign students to course of courses to students.

### **Note: Assignment only for own class**

Please note that students can only be assigned to courses that are permitted for their class. A year 12 student can therefore not take a course that is only held for year 13.

A course can also not be assigned when a student has already chosen another course with the same division number.

Assignment can be performed in various ways:

- [by double-click](#)
- [by drag&drop](#)
- [by pressing the appropriate button](#)
- [by marking elements](#)

### **2.5.4.1 Assignment with double-click**

The easiest way of creating (or removing) an assignment is to use the mouse double-click. First select a student and then double-click on the course that you wish to assign. You can assign further courses to the student by continuing to double-click. If a course is already assigned to the active student, the double lick removed the assignment.

### **Note: Locking the display**

You will find the <Lock display> button at the top left of the course and student windows. Clicking this button locks the window concerned. This results in the three windows always being displayed as if the locked window were the active window.

Double-clicking can be used to assign students to courses in the same way as assigning courses to students



### 2.5.4.2 Assignment using drag and drop

You can also establish or remove an assignment between students and courses using drag and drop.

The following options are available:

#### **Assign one or more courses to a student**

Select the desired courses in the course window and drag the selection to the desired student in the student window. When dragging the selection, up to ten courses will be displayed near the cursor.

#### **Assign one or more students to a course**

Select the desired students in the student window and drag the selection to the desired course in the course window. When dragging the selection, up to ten students will be displayed near the cursor.

#### **Copy course assignments of a student**

If you wish to copy one or more course assignments from one student to another, first select the desired student in order to display his/her assigned courses in the detail window. Now select the desired course assignments and drag them to the student to whom the courses are to be assigned.

#### **Copy student assignments of a course**

First select the desired course in order to display its assigned students in the detail window. Now select the desired student assignments and drag them to the course to which the students are to be assigned.

#### **Remove course assignment from a student**

Select the desired student and then select the courses in the detail window in the centre of the screen that are to be removed. Drag the selection down to the free area below the course list in the centre section. The cursor will display a delete icon, and after the mouse button is released the corresponding course assignments will be removed.

#### **Remove students from a course**

Select the desired course and then select the students in the detail window in the centre of the screen that are to be removed. Drag the selection down to the free area below the course list in the centre section. Release the mouse button when the cursor displays the delete icon in order to remove the students from the course.

### 2.5.4.3 Assignment using toolbar icons

You can use assignment functions in the toolbar to assign one or more courses simultaneously or to remove the assignment.



## Assignment

First select all the courses that you wish to assign to a particular student by moving the cursor over them while pressing the left mouse-button.

Now select one or more students to whom you wish to assign the selected courses and click on the <Allocate selected students/course> button.

All selected courses will be assigned to the selected students. You can of course first select the students and then the courses.

**Note: Error message**

An appropriate message will be displayed if a course cannot be assigned to a student. However, other courses assignments will not be affected..

**Remove assignment**

In the same way, you can also remove existing course assignments using the <Delete student/course assignment> button.

**2.5.4.4 Assignment using element marking**

These assignment functions are available via the context menu commands (right-click).

First mark all the courses that you wish to assign to a student by checking the mark box. Now select a student in the student window, open the context menu using the right mouse-button and select the command 'Link marked courses'. All marked courses will now be assigned to the selected student. You can proceed in the same way to assign students to a course.

The following marking commands are available in the context menu:

**Mark students**

When you have selected a course in the course window this command displays all the students (highlighted in light blue) assigned to this course with a checked marking box.

**Mark courses**

When you have selected a student in the student window, this command displays all the courses (highlighted in light blue) assigned to this student with a checked marking box.

**Remove course markings**

This command removes all course markings.

**Remove student markings**

This command removes all student markings.

**Remove all markings**

This command removes all course and student markings.

**Link marked students**

When you select a course and execute this command, all marked students will be assigned to the course.

**Link marked courses**

When you select a student and execute this command, all marked courses will be assigned to the student.

**Delete course linkin**

When you select a course and execute this command, the assignment of all marked students to this course will be removed.

**Delete student linking**

When you select a student and execute this command, the assignment of all marked courses to this

student course will be removed.

**Note: Context menu**

Some of these commands are only available in the course window context menu or in the student window context menu.

## 2.5.5 Toolbar functions

The following functions can be performed via the toolbar.



### Class-level selection

You can restrict the display of courses and students to a particular class level/year.

### Class selection

You can restrict the display of courses and students to a particular class. A class selection quite naturally overrides a class-level (year) selection.

### Adjust window size

This function adjusts window size to the width of the visible columns.

### Allocate selected students/course

All selected courses are assigned to the selected students.

### >Delete student/course allocation

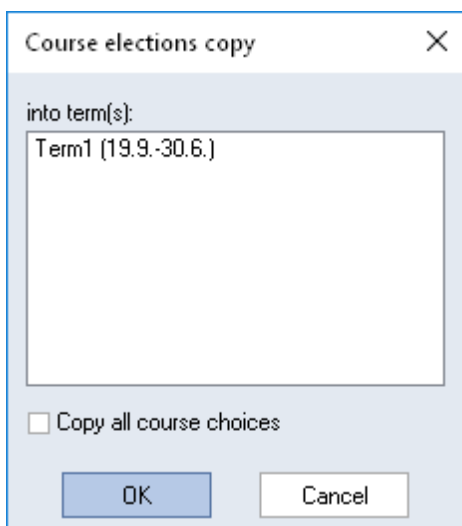
The course assignment of the selected courses to the selected students are removed.

### Cancelling a course

This function is only possible with the course scheduling module and is described in chapter [Cancelling a course](#) .

### Create parallel courses

This function is only possible with the course scheduling module and is described in chapter [Creating parallel courses](#) .



**Find**

Clicking on this button opens the "Find" dialogue. This is where you can enter the desired search text. Clicking on the <Find next> button causes Untis to search in the current column for the search text. If the text is found, the relevant row will be selected.

**Convert lesson**

This function opens the lessons window. If you have restricted the display to a certain class, it will be displayed automatically in the lessons window.

In the lessons window you can mark desired lessons by moving the cursor over them while pressing the left mouse-button and then converting them into courses using the button < [Convert lessons\(s\) into course\(s\)](#) >.

**Remove lesson**

This function allows courses to be removed from the student course choice. These courses are then no longer displayed in the course lists. The function is useful when e.g. a course should be taken (again) by all students in a class and is therefore no longer available as a student course choice.

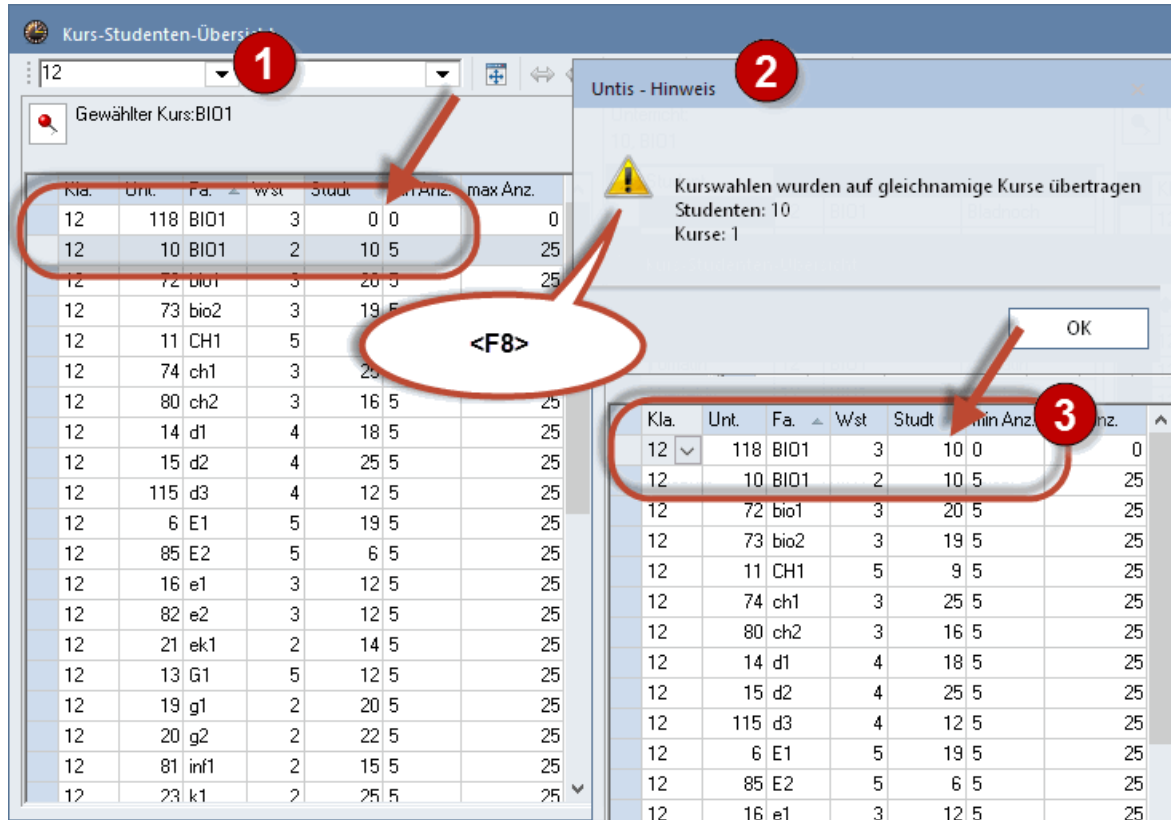
**Lock this display**

If this button is activated, the window will not respond in the [course-student-overview](#) when the active lesson of active student is changed in another window.

**Function without button: Copy student allocation of one part of the course to all other parts**

It can happen that a course is split into several parts due to scheduling reasons. In this case you do not need to allocate the students several times to the different parts of the course. It is sufficient to allocate the students to a lesson and then copy the allocation to all courses of the same name via <F8>.

In the example below biology course BIO1 is split into a 2 period and a 3 period part. Originally only 10 students were assigned to the 2 period part with this lesson number. By clicking <F8> the allocation will be copied to the 3 period part with lesson number 118.



**Refresh**

Refreshes the displayed data and sets up the window anew

**Filter**

Shows (or hides) a filter line in the active part of the window

**2.6 Simultaneous courses (clusters)**

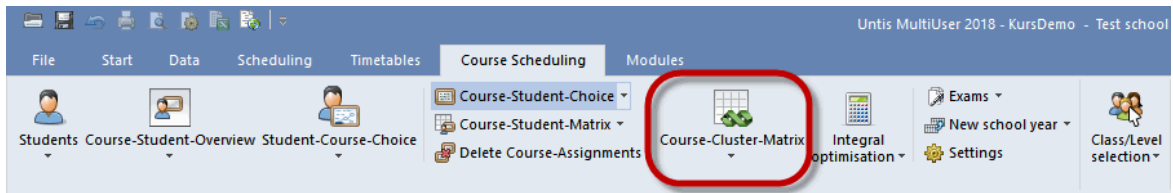
However, when the range of courses is so wide that the total number of periods of all courses exceeds the available number of weekly periods, or when students have a very wide freedom of choice, a decision must be reached as to which courses should be held simultaneously in order to improve the quality of the timetable.

In the context of the students timetables module, you yourself must specify which courses should take place simultaneously.

**Note: Course scheduling module**  
 This is where the course scheduling module comes into its own since it performs exactly this task, determining which courses take place simultaneously. Please refer to section [Course scheduling](#).

**Simultaneous lessons**

You can access the input window for simultaneous groups/clusters via <Simultaneous lessons> on the 'Students timetable' tab. (When you use the *Course scheduling* module you enter data via the so-called course-cluster matrix).



If you wish to create a new cluster, simply click in an empty row where you then enter the lesson numbers of the course that are to take place simultaneously.

Lesson sequences

C13\_1 [Delete] Simultaneous lessons

Lessons

14 [Add] [Remove]

Display

Lesson number  Subject  L-No. + Subject

Name	Per	L-No.	L-No.	L-No.	L-No.
C13_1	2	14	15	115	
C13_2	2	95	96	97	
T1_1	5	6	9		
T1_2	5	87	90		
T10_1	2	21	22	84	115
T10_2	2	101	106		
T11_1	2	23	86		
T11_2	2	97	100	104	
T12_1	2	14	20	24	
T12_2	2	95	113		

L-No.	Per	Teacher	Class	Subject
14	4	Goethe	12	g1
15	4	Bach	12	g2
115	4	Ander	12	g3

The cluster C13\_1 includes e.g. lesson numbers 14, 15 and 115 that are to take place in parallel for two periods in the week.

The section at the bottom of the window displayed additional information on the lessons in the selected group.

During timetable optimisation the aforementioned lessons will be set at the sometimes. Only during the so-called swap optimisation can individual lessons be moved in order to improve student timetables.

**Note: Simultaneous lessons instead of lesson couplings**

You may be tempted to enter lessons that take place simultaneously as a lesson coupling. We would advise against doing this as it can lead to problems with the unique identity of courses (e.g. with a lesson coupling in which the same subject occurs twice) and as timetable optimisation is restricted by fixed couplings.

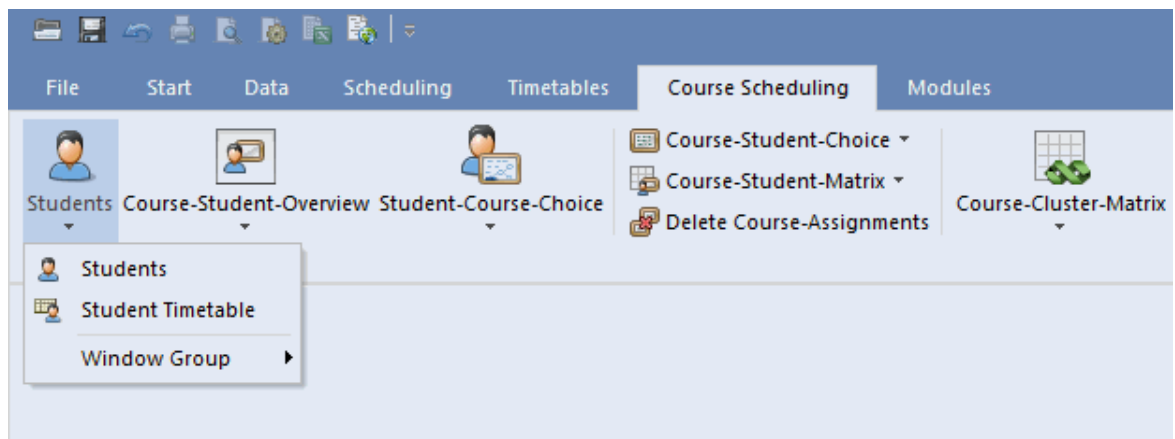
If you already have lesson couplings that you would like to convert to clusters, you can simply mark the lesson couplings concerned (by activating the '(m) marked'code for the coupled lessons in the lessons view) and execute the command 'File | Auxiliary Functions | Coupl. to Less. Sequ.'.

## 2.7 Manual Scheduling

You have several tools at hand for manual scheduling of individually selected courses, just like 'normal' scheduling where you schedule lessons per class.

### 2.7.1 Timetables

When the students timetables module is used, the menu item 'Students' is also activated in the 'Timetable' menu and opens the timetable for an individual student.



**Note: Timetables for students**

As with timetables for other elements, you can also adapt student timetables to match your requirements and create your own timetable formats. You can find more information on this feature in the chapter 'User-defined views' in the 'Untis User Manual'.

#### Course-student overview as magnifier

The detail window of the course-student overview can also serve as a magnifier when displaying student timetables. Reduce the size of the course-student overview so that only the detail windows can be seen and locate it next to a student's timetable. If you now page from student to student in the timetable, you will see the course choices for the relevant student in the detail window.

The image shows two windows from a scheduling software. The left window, titled 'Laphroaig - Laphroaig 12 i ta...', displays a timetable for the term '24.9.2018 - 30.6.2019'. The timetable is a grid with days of the week (Mo, Tu, We, Th, Fr) as columns and lesson periods (1-10) as rows. Lesson 're11' is assigned to period 1 on Monday and period 10 on Friday. A detailed view at the bottom shows lesson 23 by teacher Beck, with subjects 're11, r12' in room 12.

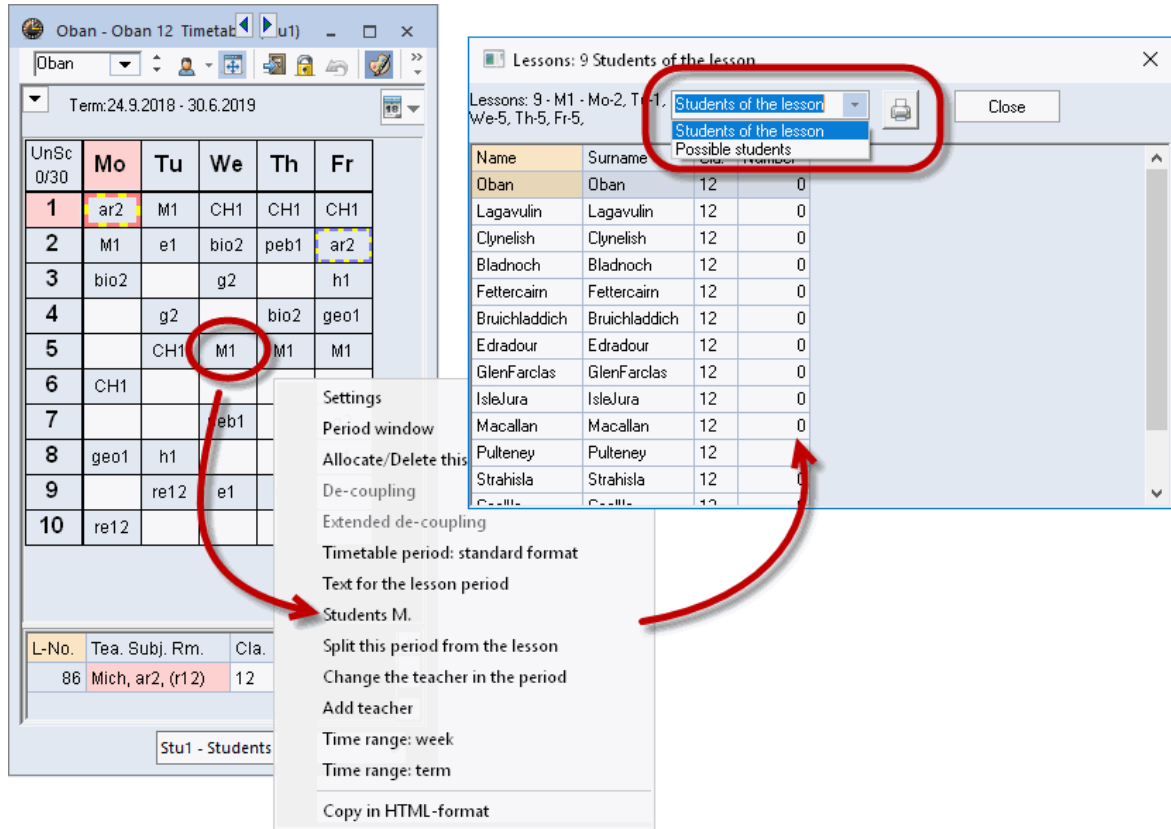
The right window, titled 'Course-Student overview', shows a list of lessons for the selected course 're11'. The list includes lesson numbers, subjects, teachers, and the number of choices. Lesson 23 is highlighted.

Les.	Subj	Tea.	Choices	Assi.Les.Grp
116	ru1	Pas	5	
83	re21	Luth	6	
24	re12	Stu	40	
105	re12	Grill	30	
23	re11	Beck	40	
104	re11	Mag	30	
12	PH1	Gal	9	
93	PH1	New	11	
111	ph1	Meit	13	
78	peg1	Bach	24	
114	peg1	Bach	18	
113	peb2	Ander	39	
76	peb1	Ander	31	
112	peb1	Phid	39	
84	orc1	Callas	8	
18	mu1	Callas	19	
71	m2	Colu	40	
108	m2	Gauss	43	
9	M1	Fer	15	
90	M1	Kep	13	
70	m1	Eul	40	
107	m1	Pas	43	

### Students of the lesson – Possible students

After creating a timetable it is sometimes necessary for single lessons to determine which students could possibly additionally attend this lesson based on the timetable. Right-click on a period and select 'Students'. The dialogue popping up provides you with the possibilities to show students already assigned to this lesson, and the ones who could be assigned without creating any clashes.





Student timetables can certainly be [printed](#) or output in HTML format like any other timetables.

### Timetable settings

On the 'Layout 2' tab under <Timetable settings> of class timetables you may check the box 'Cluster mode' for grouping unscheduled periods according to the clusters. They will then not be listed individually next to the timetable. Drag and drop the clusters into the timetable. Even if a cluster has already been scheduled in the timetable, it will be dragged as a unit when shifted.

The screenshot shows a software window titled "13 - Year 13 Timetable (Cla1A)". The main window displays a timetable grid for the term "24.9.2018 - 30.6.2019". The grid has columns for days of the week (Monday to Friday) and rows for periods. A dialog box titled "Layout 01 - Individual timetable with days across the top" is open in the foreground. It has several tabs: "General", "Selection range", "Layout 1", "Layout 2", and "HTML". The "Layout 2" tab is active, showing various options for formatting and printing. The "Cluster-mode" checkbox is checked and circled in red. A red arrow points from the "Cluster-mode" checkbox to a course labeled "CH No" in the timetable grid, which is part of a cluster of courses.

You can remove single courses from a cluster provided you checked the box 'Separate periods in case of clash' on the 'Layout 2' tab. Drag and drop it on another slot in the grid. When you click on the course, hold the <Ctrl> key down.

12 - Year 12 Timetable (Cla1A)

School year: 17.9.2018 - 28.6.2019

	Monday	Tuesday	Wednesday	Thursday	Friday
1	8:00-8:45 re11 B ar Mi	ch Me rch	CH Cur rch L1 Cic r12 E2 Sh		CH Cur rch L1 Cic r12 PH Gal rph
2	8:55-9:40 E1 Sha M Fe	e1 C m2 Col	ch1 Me rch bio Fos r12 ru1 Pa	peb1 A peg1 B	re11 B ar Mi
3	9:50-10:35 ch1 Me rch bio Fos r12 ru1 Pa	BIO No rch Eco Sm r12 H1 Cer	g2 Bac th2 ch2 Me rch		
4	10:45-11:30 BIO No rch Eco Sm r12 H1 Cer	eth g2 Bac th2 it1 Ne rph			
5	11:40-12:25				
6	12:35-13:20				
7	13:30-14:15 g3 Ander r12				
8	14:25-15:10 eco Mar geo Col r12 orc Cal h1 H m C ar R r1 re L BIO No rch				
9	15:20-16:05 bio1 Fos r12 h2 Gril g1 Go r12 re1 Stu e1 C				

L-No. Tea. Subj. Rm. Cla.

+3

Layout 01 - Individual timetable with days across the top

General Selection range Layout 1 Layout 2 HTML

Period window

- Double periods like single periods
- Comb. class names (2a,2b->2ab)
- All classes in one field
- Mark couplings with a dot
- Mark clash periods with "\*" (asterisk)
- Separate periods in case of clash
- Sort periods
- Merge matching periods

Cover planning

- Show absences
  - No reason of absence
  - Only full day absences
- Only cover periods
- Strike through cancellations

Manual scheduling

- DragDrop: Multiple lessons
- DragDrop: colours same as time requests
- DragDrop: show chained swaps
- Cluster-mode

Changed Periods

- Red
- Bold
- Italic
- Emphasised by '!'
- Underlined

Print

- Do not print empty rows
- Do not print empty columns
- Print black \_white
- 1 heading per page
- Auto-size for the details window
- HTML index pg. with full names
- TT display in minute mode
- Show master classes separately
- Show break labels
- Use alias for details window/legend

OK Cancel Apply

### 2.7.2 Scheduling in the timetable

In general you can drag *courses* from the surface of the timetable you work on (on the right next or below the actual timetable part) into the timetable, just like any other *lesson* .

11 - Timetable (Kla1A)

School year: 28.7.2014 - 3.7.2015

11 | Goethe

UnSched 13/3	Monday	Tuesday	Wednesday	Thursday	Friday
1 8:00-8:	Germ Goeth				
2 8:55-9:	Guitar (Flute A)				
3 9:50-10:					
4 10:45-1:					
5 11:40-1:					
6 12:35-1:					
7 13:30-1:					

L-No.	Tea.	Subj.	Rm.	Cla.	Stud.
287	Goethe	German		11	

Kla1A - Klassenplan groß\*

The figure shows a class timetable where Mo-1 German (obligatory for all class 11 students) and Mo-2 guitar and flute courses are scheduled. Courses just like lessons can be dragged to the right side of the timetable.

When dragging a course onto another course in the timetable which cannot be scheduled without a clash, the details window shows the names of the students in red where a clash would occur.

11 - Timetable (Kla1A)

School year: 28.7.2014 - 3.7.2015

11 | Goethe

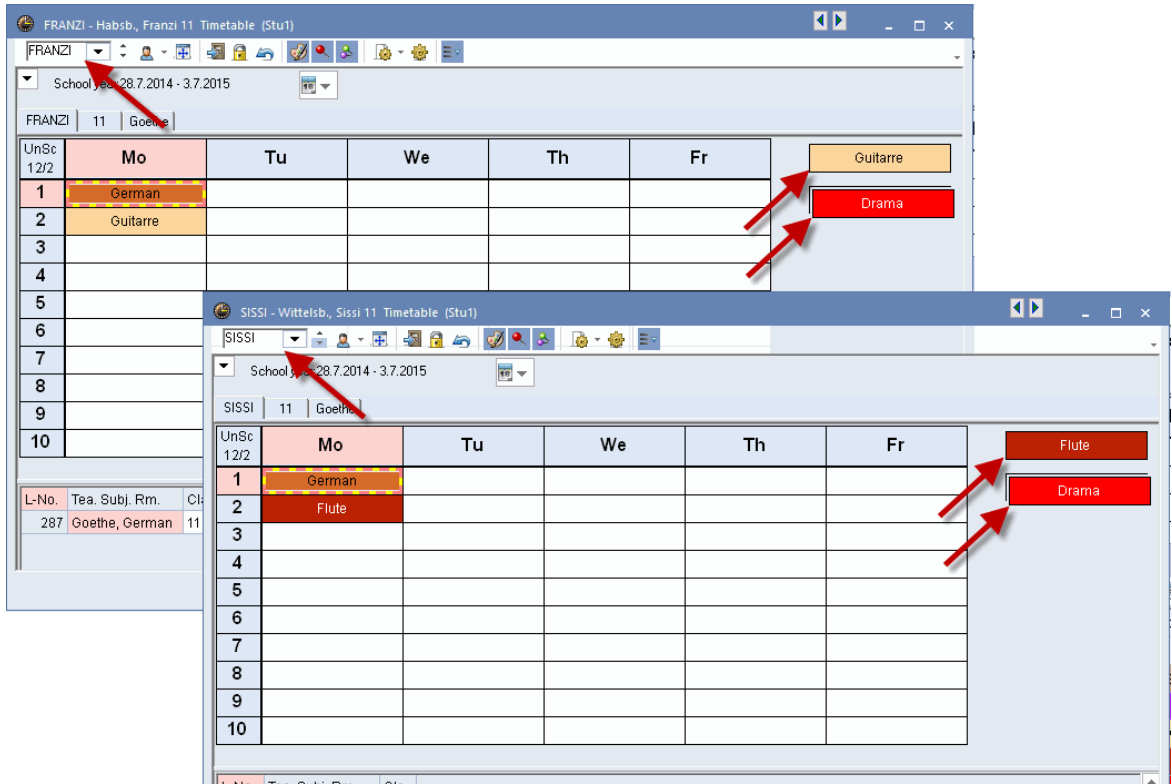
	Monday	Tuesday	Wednesday	Thursday	Friday
1 8:00-8:	Germa Goeth				
2 8:55-9:	Guitar (Flute A) Dram Malkov				
3 9:50-10:					
4 10:45-11:					
5 11:40-12:					
6 12:35-13:					
7 13:30-14:					

L-No.	Tea. Subj. Rm.	Cla.	Stud.
288	Clapton, GUITARRE	11	1
289	Anderson, Flute	11	

Students: 2  
FRANZI

Kla1A - Klassenplan groß\*

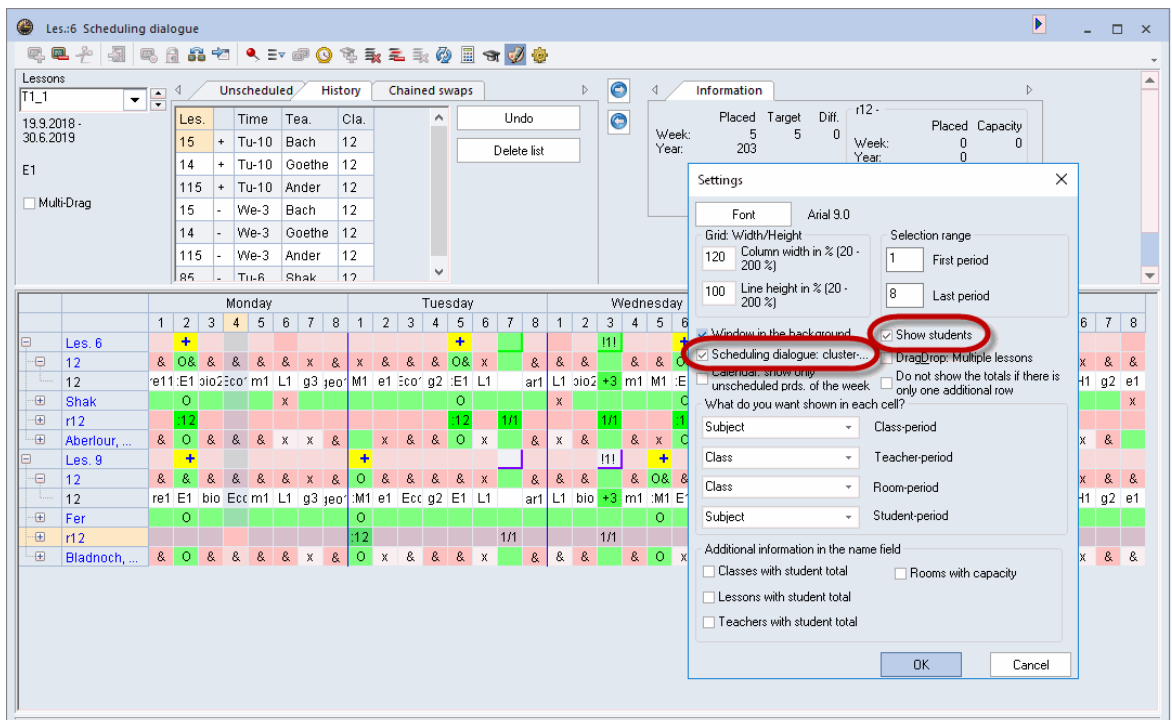
Additionally you can schedule courses directly in the timetables of the students (Type: Student timetable). In the area next to the timetable individually chosen and not yet scheduled courses of the students are shown.



### 2.7.3 Scheduling dialogue

Student choices are of course also taken into account in the scheduling dialogue. If a lesson is allowed as a student choice you will see all students taking this lesson in the scheduling dialogue.

However, you can also hide the display of students by deactivating the check box 'Students display' in the scheduling dialogue settings.



You will often see the '&' character in the rows of the classes indicating that several lessons are held simultaneously (for different students) in the class.

### Cluster mode

You can also edit several lessons of a cluster in the scheduling dialogue at the same time by entering the name of the cluster in the 'Active lesson' field or by activating the check box 'Scheduling dialogue: band mode' in the scheduling dialogue list settings and then selecting a lesson in the cluster.

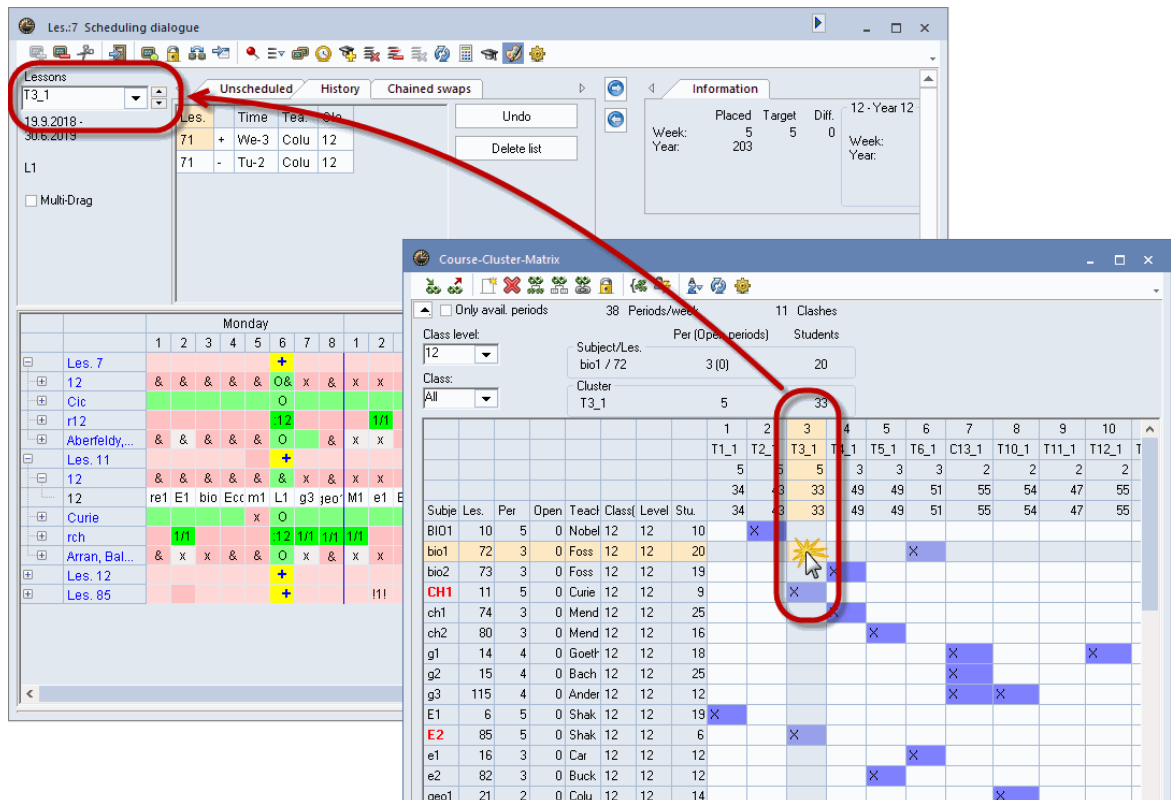
This will activate an entire cluster instead of a single lesson and will show all the lessons belonging to that cluster. If the same class occurs in several lessons, it will only be displayed once.

The scheduling functions <Schedule period> and <Delete period> have an effect on all lessons in the cluster, meaning that the entire lessons of a cluster (or in other words the cluster itself) can be scheduled or descheduled at the desired time with one action.

**Note: Active cluster**

When a cluster is displayed in the lesson magnifier, you can also make this cluster the active cluster by double-clicking on the cluster name.

If the scheduling dialogue is operated in the 'Cluster mode', it will synchronise with the course-cluster matrix when you click on a cluster.



**Tip:**

In the cluster mode all lessons involved in a cluster are displayed one below the other. By clicking on the blue '+' in the lesson line and dragging it, the whole cluster will be moved. If you click on a teacher line and drag and drop it somewhere else, only this single lesson will be moved.

The screenshot shows the 'Les.:13 Scheduling dialogue' window. The left pane lists lessons: 13 (19.9.2018 - 30.6.2019), H1, and Multi-Drag. The main area has tabs for 'Unscheduled', 'Information', 'History', and 'Chained swaps'. Below these is a table with columns: Les., Uns, Time, Cla., Tea., Sub. The right pane shows 'Periods: 0' and checkboxes for 'All unsched. periods' and 'Only for the active weeks'. The bottom part is a grid with columns for days 1-8 of Monday and Tuesday. Rows include 'Les. 13', '12', 'Cer', 'r12', and 'Bunnahabai...'. A red circle highlights a blue '+' icon in the 'Les. 13' row on Monday, with a callout bubble stating 'Drag&Drop: the whole cluster will be moved'. Another red circle highlights a teacher line for 'Cer' on Monday, with a callout bubble stating 'Drag&Drop: only lesson 91 will be'.

## 2.8 Timetable optimisation

The students timetables module greatly enhances automatic optimisation . The following points are dealt with here:

### Classes

Lessons for different students may take place in a class at the same time. If students are assigned to a particular lesson, Untis will itself determine when lessons can take place simultaneously.

### Student timetables

Nearly all the points that apply to the optimisation of class timetables are also taken into account when student timetables are optimised. The required parameters (e.g. minimum/maximum lunch break, periods per day etc.) are taken from the student's class.

The weightings are also derived from those of the class. However, a student is naturally not weighted as highly as a class. The more students there are taking a lesson, the higher the relevant weightings.

### Cluster conditions

The first phase of optimisation is the allocation run, when all lessons are distributed in the (still empty) time grid. The swap optimisation run that follows transposes periods based on class timetables.



Lessons contained in [cluster conditions](#) are scheduled at the same time during allocation optimisation. These conditions do not apply during swap optimisation, and lessons can be moved independently of one another.

## Optimisation settings

The optimisation dialogue provides you with some additional options when working with the course scheduling module.

### Do not allow student clashes

The screenshot shows the 'Control Data for Optimisation' dialog box. It contains several sections of controls:

- Optimisation Run:** Includes a dropdown for 'Optimisation strategy (A,B, ...)' set to 'A - fast optimisation', a spin box for 'Optimisation series: No. of TTs (1-20)' set to 3, and a spin box for 'Optimisation level (1-9)' set to 2.
- Teacher assignment during optimisation:** Includes checkboxes for 'No optimisation of teach. assign.', 'No swap with other subjects', 'Swap only less. with equal periods', and 'Swap only within one class level'. A 'Re-assign original teachers' button is also present.
- General options:** Includes checkboxes for '% of periods to be scheduled (blank=100%), then STOP', 'Similarity to previous TT: 0=not similar..., 4=very similar', 'Lock timetable conditionally', 'Only requested days off for tea.', 'Consider room capacity' (checked), and 'Off site buildings by the half day'.
- For strategy D:** Includes a spin box for 'Increment percentage' set to 5, and checkboxes for 'With pre-optimisation' and 'Retain the current calendar distribution'.
- 13% Double periods:** Includes a checkbox for 'Special 'double periods'-optimisation'.
- Optimisation of courses:** Includes checkboxes for 'Re-calculate clusters' and 'Optim. courses separately'.
- Bottom section:** The checkbox 'Do not allow student clashes' is checked and highlighted with a red oval.

Timetable optimisation usually allows for a small number of student clashes, since it is assumed that the advanced level coordinator (pedagogic coordinator, course supervisor) will clear up any clashes in individual meetings with the students. Clashes are shown following the optimisation in the Diagnosis.

The *Do not allow student clashes* option allows no clashes at all, bringing about a higher number of unscheduled periods.

### Re-calculate clusters

**By checking this box a timetable optimization will automatically be carried out before the integral optimisation**

**Optim. courses separately**

By checking this box, the first optimisation run initially optimises all courses

. When the optimisation of the courses is complete, a second optimisation run will be carried out for scheduling the remaining lessons

The two latter options are only active when you use the Course scheduling module.

## 2.9 Diagnosis

The diagnosis for students displays, on the 'Students' tab, students with clashes, non-teaching periods and lunch breaks that are too short or too long.

24.09.2018 - 30.9.2018

Input Data Timetable

	Wtg	Num
<b>Diagnosis</b>		
<b>Class</b>		10
Subject only once per day not possible	3	0
Classes: not enough periods available	*	0
Class-coupl.: diverting class-group nrs	*	0
Positive time request during lunch break	4	10
Class teacher once per day not possible	2	0
Critical periods (teacher deficit)	*	0
<b>Teacher</b>		0
Teacher: not enough periods available	*	0
Lessons with teachers without rooms	*	0
Positive time request during lunch break	4	0
<b>Room</b>		0
2 teachers in the same room	*	0
<b>Lesson sequences</b>		0
Cluster impossible to sched. (blocking -3)	*	0
<b>Course scheduling</b>		1
Course with no students assigned	*	0
Course with all students of a class	*	0
Course-coupling: same subject in 2 rows	*	0
Course choice: lesson more than once	*	0
Course: 0 students from class	*	0
Cluster impossible to schedule (dbl. - single - prds.)	*	0
Overbooking and underbooking of courses	*	1
<b>Lessons</b>		0
Less. impossible to sched. (blocking -3)	*	0
Too many double-periods	2	0
Locked less. (X) with unsched. periods	*	0

**Type of diagnosis**

You can enter a minimum and maximum number of students per course. If too many (or not enough) students have chosen a given course, it will not be possible to respect these lower and upper limits. The analysis respects the choice of alternative courses of the students. Even if single courses satisfy the condition there is at least one course for which the number of students will either be below the minimum or above the maximum.

**Weighting: \***  
**Number: 1** Show related windows

L-No.	Sub.	Opt.Nr.Stud	Students	Nr.Alt.
76	peb1	31(5-25)	31	0

**Timetable diagnosis**

24.09.2018 - 30.9.2018

Input Data | Timetable

Diagnosis	Wtg	Num
All		>= 1
<b>Lessons</b>		
<b>Class</b>		
Lunchbreak too short	4	4
Class NTP's	4	2
+3 time request not respected	3	3
Class clash not permitted	*	2
<b>Teacher</b>		
Double Non-Teaching-Period		31
Just one period on a half day	3	154
Too many lessons in the last a.m. period	3	3
<b>Room</b>		
Subject room not allocated	3	3
Period(s) without a room	3	76
<b>Subject</b>		
Less. with 2 perds/week on consec. days	3	13
Less. with 3 prds/week on consec. days	1	1
Illegal afternoon period	2	5
<b>Students</b>		
Non-Teaching-Periods for Students	4	493
Lunchbreak too short	4	46
Lunchbreak too long	4	194
Student clashes not allowed	*	6
<b>Lesson sequences</b>		
<b>Calendar - Year Planning</b>		

**Type of diagnosis**  
There are NTPs (non-teaching periods, undesired free periods) in the timetables of these students.

**Weighting: 4**  
**Number: 493** [Show related windows](#)

Stu.	Cl.	Per.
Oban	12	Mo-4
Oban	12	Mo-5
Oban	12	Mo-9
Oban	12	Tu-3
Oban	12	We-4
Oban	12	We-8
Oban	12	Th-3
Talisker	12	Mo-9
Talisker	12	Tu-4
Lagavulin	12	Mo-4
Lagavulin	12	Mo-5
Lagavulin	12	Tu-2
Lagavulin	12	Tu-3
Lagavulin	12	Tu-5
Lagavulin	12	We-4
Lagavulin	12	We-8
Lagavulin	12	Th-3
Lagavulin	12	Fr-9
Laphroaig	12	We-5
Laphroaig	12	Fr-8

**Course with no students assigned**

Courses with no students assigned should be ignored.

**Courses with all students of a class**

Courses to which all students have been allocated need to be removed from course choice and converted into a lesson.

**Course coupling: same subject in 2 rows**

If a *coupling* is converted into a course, there must not be the same subject in two rows of this coupling, since many functions of the *Student timetable* and *Course scheduling* modules may fail.

**Course choice: lesson more than once**

If a course is coupled and a student is assigned to two courses in one coupling, it will be shown here.

**Course: 0 students of class**

When creating this course (in a lesson window), one or several classes were entered into the 'Class(es)' field but no student chose this course. For optimization purposes it is better to remove this class from the respective 'Lesson definition'.

**Cluster impossible to schedule (dbl.-single prds.)**

This cluster holds contradictory double and single period requirements. Therefore, this cluster cannot

be scheduled in this format.

### Overbooking and underbooking of courses

The number of assigned students is in conflict to the data entered in 'Min. number of students/course' and 'Max. number of students/course'

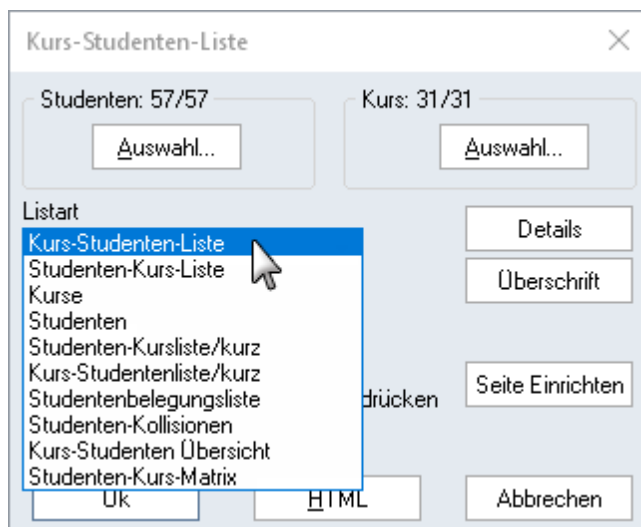
The 'Timetable' tab shows those students whose timetable has NTPs and clashes or where the lunch break is too long or too short.

## 2.10 Course-student lists

There are a number of lists that can be printed and to a large part also output in HTML format.

These lists are accessed direct from the [course-student overview](#) by clicking on the <Print> or <Print preview> buttons in the Quick Access Toolbar.

After calling the print command, the initial print dialogue is opened where you can select the desired list type.



The following list types are available for selection:

- [Course-Students-List](#)
- [Students/Course-List:](#)
- [Courses](#)
- [Students](#)
- [Studs/Course-List \(short\)](#)
- [Course/Stud.-List \(short\)](#)
- [Students/Cluster-List](#)
- [Student-clashes](#)
- [Student/Course-Matrix](#)

The initial print dialogue allows the font and margin settings to be modified for all lists. Furthermore, printing can be limited to

selected courses and students.

If courses have had to be distributed over several rows of lessons during the creation of the timetable (e.g. in order to be able to specify that 2 periods of a 5-period course have to take place in the afternoon), the subject names of these courses will be repeated in the lists.

When several courses share the same name (within a class), the "Suppress double courses in selection" option causes only one course to be selected and thus only one of these courses to be printed. This option can therefore be used to avoid courses with the same name appearing e.g. in the "Studs/Course-List (short)".

You can specify what should be printed when a teacher or student name appears in a list on the "Print-names" tab' in the dialogue Report-Settings (menu item "Reports | Report Settings"). By default, the short names of these elements are printed. However, if you wish for example to print students' first and last names instead of short names in the 'Course/Students List', select "Stud. First+Full N." as the 'Print-name for students'.

### 2.10.1 Course/Students-List

The students taking each selected course will be printed. Please note that you can activate different options in the initial print dialogue under <Details>.

Kurs-Studenten-Liste

BIO1 LK Biologie 1 (Unterr: 91)

Name	E-Mail	Statistik	Kla.	Wahl-Stat.
Alice	Alice@schule.eu	0	13	m
Bianca	Bianca@schule.eu	0	13	s
Duchesse	Duchesse@schule.eu	0	13	s
Esmeralda	Esmeralda@schule.eu	0	13	m
Jaq	Jaq@schule.eu	0	13	s
Jasmin	Jasmin@schule.eu	0	13	s
Klopfer	Klopfer@schule.eu	0	13	s
Perdi	Perdi@schule.eu	0	13	s
Schneewitchen	Schneewitchen@schule.eu	a	13	m
Susi	Susi@schule.eu	0	13	m
			10	

Gruber & Petters

### 2.10.2 Students/Course-List

This list prints the lessons for each selected student.

Please note that by default these lessons are made up of lessons from the class lessons (lessons that must be taken by all students in the class) and the student's chosen courses.

You can restrict the list to course selections only via the <Details> button..

## Students/Course-List

## Oban Oban 12

Crse.		Les.	Stat. code(s)	Per	Tea.
M1	Adv. Mathematics 1	9		5	Fer
CH1	Adv. Chemistry 1	11		5	Curie
g2	Basic German 2	15		4	Bach
e1	Basic English 1	16		3	Car
ar2	Basic Art 2	86		2	Mich
h1	Basic Histroy 1	19		2	Hero
geo1	Basic Geography 1	21		2	Colu
re12	Basic Religious studies1 2	24		2	Stu
bio2	Basic Biology 2	73		3	Foss
peb1	Basic Physical Ed. Boys 1	76		2	Ander
	Total			30	

Gruber &amp; Petters Software

**2.10.3 Courses list**

Courses list The courses list prints the courses with all the fields that are displayed in the course window of the course-student overview.

Class	Lesson	Subject	DNo	Stud	Per	Teacher	Cluster	Cluster	Cluster	Cluster	Cluster	Cluster
12	10	BIO1	1	10	5	Nobel	T2_1	T2_1	T2_1	T2_1	T2_1	T2_1
12	11	CH1	2	9	5	Curie	T3_1	T3_1	T3_1	T3_1	T3_1	T3_1
12	6	EN1	3	19	5	Shak	T1_1	T1_1	T1_1	T1_1	T1_1	T1_1
12	13	G1	4	12	5	Cer	T2_1	T2_1	T2_1	T2_1	T2_1	T2_1
12	7	LA1		9	5	Cic	T3_1	T3_1	T3_1	T3_1	T3_1	T3_1
12	9	M1	5	15	5	Fer	T1_1	T1_1	T1_1	T1_1	T1_1	T1_1
12	12	PH1		9	5	Gal	T3_1	T3_1	T3_1	T3_1	T3_1	T3_1
12	8	WR1	6	21	5	Smith	T2_1	T2_1	T2_1	T2_1	T2_1	T2_1

**2.10.4 Students list**

The students list prints the students with all the fields that are displayed in the student window of the course-student overview.

Class	Name	Surname	First name	Per	Courses	Courses
12	Oban	Oban		30	10	10
12	Talisker	Talisker		31	10	10
12	Lagavulin	Lagavulin		30	10	10
12	Laphroaig	Laphroaig		33	11	11
12	Scapa	Scapa		31	10	10
12	Glen Ord	Glen Ord		33	11	11
12	Chynelish	Chynelish		30	10	10

**2.10.5 Studs/Course-List (short)**

Course choices for each selected student will be printed in a compact format.

This list prints the chosen courses for each selected student. In contrast to the students/course list, several courses are output in one row. You can specify the maximum number of courses that can be output in one row via the <Details> button.

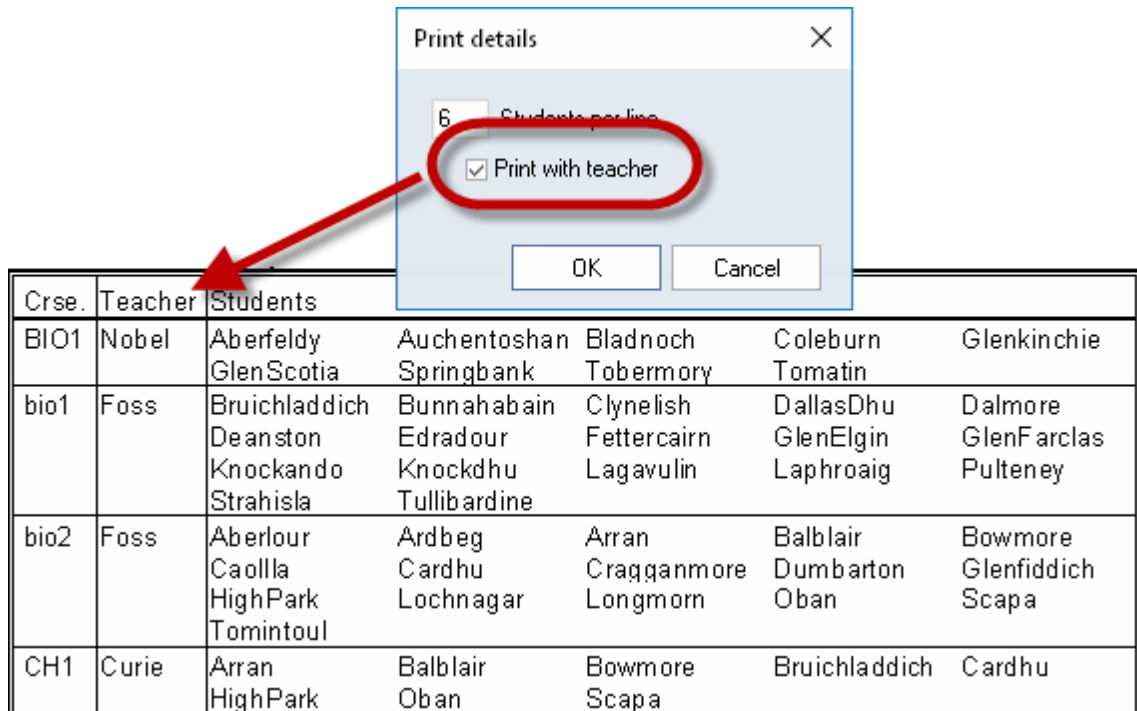
Name	Course options
Oban	M1 CH1 g2 e1 ar2 h1 geo1 re12 bio2 peb1
Talisker	E1 H1 g1 ar1 geo1 re11 m2 ch2 peg1 ru1
Lagavulin	E2 M1 g2 ar2 h1 geo1 re12 bio1 ch1 peb1
Laphroaig	E1 H1 g1 ar1 geo1 re11 m1 bio1 ch1 it1 peb1
Scapa	Eco1 CH1 e1 ar1 h2 eth1 m1 bio2 peg1
GlenOrd	L1 Eco1 g2 ar2 h1 re12 m2 ch1 peg1 e2 orc1
Clynelish	L1 M1 g2 ar2 h1 eco1 re12 bio1 ch1 peb1
Bladnoch	M1 BIO1 g2 ar2 e1 h1 geo1 re12 ch2 peg1 ru1
Fettercairn	L1 M1 g2 ar2 h1 geo1 re12 bio1 ch1 peg1
Ardbeg	E1 Eco1 ar1 h2 eth1 m2 bio2 ch2 peb1
Bowmore	Eco1 CH1 g1 e1 ar2 orc1 h1 eth1 m1 bio2 peb1
Bunnahabain	E1 H1 g1 ar1 geo1 eth1 m1 bio1 ch1 peb1
Arran	Eco1 CH1 e2 ar2 h1 re12 m2 bio2 it1 peb1
Tobermory	E2 BIO1 g2 ar2 h1 eco1 re12 m1 ch1 peb1
GlenElgin	E1 H1 g1 mu1 geo1 re11 m1 bio1 ch1 peb1 it1
Cardhu	Eco1 CH1 e2 ar2 h1 re12 m2 bio2 peb1 it1
Glenkinchie	L1 BIO1 g2 ar2 h1 geo1 re12 m1 ch1 peg1
Bruichladdich	M1 CH1 g2 e2 ar2 h2 geo1 re21 bio1 peb1
Springbank	E1 BIO1 g2 mu1 h2 eco1 re11 m2 ch2 peg1 ru1
Edradour	M1 CH1 g2 ar2 h1 eco1 re12 bio1 peg1 e2

### 2.10.6 Course/Stud.-List (short)

The students taking each selected course will be printed in a compact format.

This list prints all the students taking each selected course. In contrast to the course/students list, several students are output in one row.

You can specify the maximum number of courses that can be output in one row and if teachers shall be printed via the <Details> button.



Print details

6 Students per line

Print with teacher

OK Cancel

Crse.	Teacher	Students				
BIO1	Nobel	Aberfeldy GlenScotia	Auchentoshan Springbank	Bladnoch Tobermory	Coleburn Tomatin	Glenkinchie
bio1	Foss	Bruichladdich Deanston Knockando Strahisla	Bunnahabain Edradour Knockdhu Tullibardine	Clynelish Fettercairn Lagavulin	DallasDhu GlenElgin Laphroaig	Dalmore GlenFarclas Pulteney
bio2	Foss	Aberlour Caollia HighPark Tomintoul	Ardbeg Cardhu Lochnagar	Arran Cragganmore Longmorn	Balblair Dumbarton Oban	Bowmore Glenfiddich Scapa
CH1	Curie	Arran HighPark	Balblair Oban	Bowmore Scapa	Bruichladdich	Cardhu

### 2.10.7 Students/Cluster-List

The students/cluster list contains the students in the rows and the [clusters](#) in the columns. The fields contain the selected courses.

Student	C13_1	C13_2	T1_1
Oban	d2	M 1	ek1
Talisker	d1	EN1	ek1
Lagavul	d2	M 1	ek1
Laphro	d1	EN1	ek1
Scapa	d3		d3
GlenOr	d2		orc1
Clynelis	d2	M 1	wr1
Bladno	d2	M 1	ek1
Fetterc	d2	M 1	ek1
Ardbeg	d3	EN1	d3

### 2.10.8 Student-clashes

This list contains all students with course clashes.

This list has a similar structure to the students/course list (short) but only lists students with course clashes.



A course clash occurs when two courses taken by a student are in the same [cluster](#), i.e. when they take place at the same time

All course choices are printed for each student, with courses that clash being shown in parentheses. Information such as (M1/CH1) means that the two courses are in the same cluster.

Name	Course options
Tobermory	(EN2/BIO1) (BIO1/EN2) d2 ku2 g1 wr1
Glenmorangie	(EN2/BIO1) (BIO1/EN2) d2 ku2 g1 wr1
Deanston	(EN2/G1) (G1/EN2) (d1/EN2) ku1 wr1 eth1
Dumbarton	(EN2/G1) (G1/EN2) (d1/EN2) ku1 ek1 eth1
Speyburn	(EN2/WR1) (WR1/EN2) (d3/EN2) mu1 g2 eth1

### 2.10.9 Course-Student Overview

The Course-Student Overview shows the corresponding teacher and the number of assigned students. In the line below, the number of male/female students and next to this, the number of statistical codes of course choices are indicated.

Course	Teacher	Stu. Total	Stat. code(s)
BIO1	Nobel	10	
		3 / 7	
BIO1	Mend	10	
		2 / 8	
bio1	Foss	20	
		14 / 6	
bio1	Foss	24	
		18 / 6	

### 2.10.10 Students-Course-Matrix

This list provides an overview of the selected courses of every student.

This list shows you which students take which courses. Each student and each course are contrasted in the form of a matrix. If a student takes a particular course, then a '1' will be displayed at the intersection of student and course, otherwise the cell will be empty.

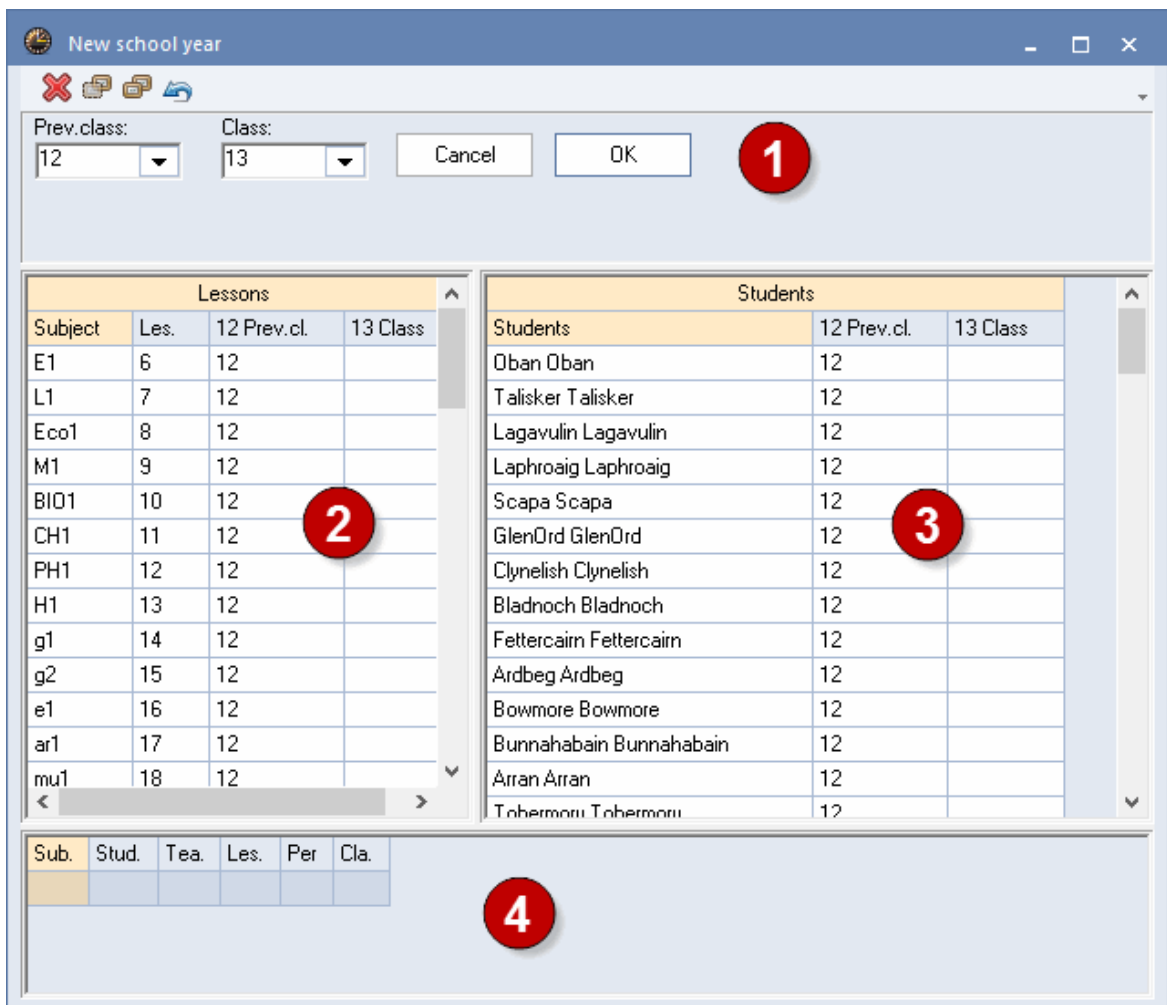
				BIO1	BIO1	bio1	bio1	bio2	CH1	CH1	ch1	ch1	ch2	q1
<b>Year 12</b>														
11	1	<b>Aberfeldy</b>		1							1			
11	2	<b>Aberlour</b>						1					1	
10	3	<b>Ardbeg</b>						1					1	
11	4	<b>Arran</b>						1		1				
11	5	<b>Auchentoshan</b>		1									1	1
10	6	<b>Balblair</b>						1		1				
11	7	<b>Bladnoch</b>		1									1	
11	8	<b>Bowmore</b>						1		1				1

## 2.11 Change of school year

Change of school year Untis helps with the change of school year providing its own tool that enables you to easily transfer students to the next class, allowing existing course choices to be retained wherever this makes sense.

- [Transfer students](#)
- [Transfer courses](#)

Select menu item "Modules | Students timetables | New school year" to open a window of the same name.



The window consists of 4 parts. At the top is the selection window (1), where you can choose the classes concerned, the centre section displays the courses (2) of the selected classes on the left and the students (3) of the selected classes on the right while the section at the bottom shows details on the current course (4).

### Note: Performing changes

Changes are not executed immediately, but are only earmarked for change. If you wish to perform the changes, you must confirm them with <OK>, or if you wish to reject them, you can click on <Cancel>.

Since all changes in the new school year window are initially only performed on copied data, you must close the window and re-open it if you wish to see the changes you have made to students or courses.

### 2.11.1 Transferring students

There are basically three possible things that can happen to a student at a school:

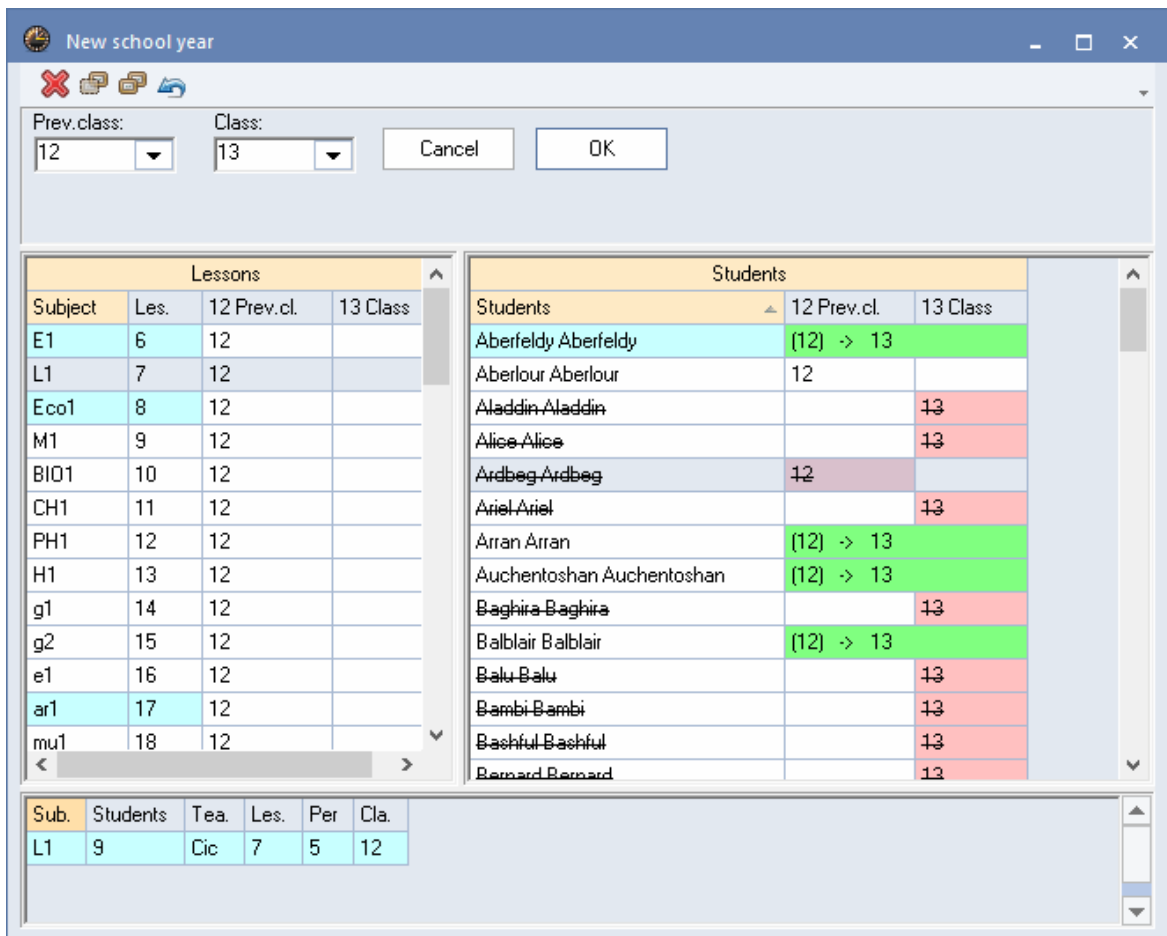
The student remains in the same class as the this year  
In this case you do not need to do anything in Untis.

The student leaves school  
In this case you should highlight the student and click on button <Delete lesson/student>. The student will be deleted from the master data.

The student transfers from one class to the next  
Select previous year's class and the current class and click on button <Transfer lesson/student>.

**Note: Several class levels/years**

If you wish to perform the school year change for several class levels, always start with the highest level and work down step by step to the lowest class level.



The figure above illustrates the following situation:

All students of class 13 have left school except for student Aladdin. He will continue in class 13.

All students of class 12 will transfer to class 13 except for Aberlour and Ardbeg. Aberlour will repeat year 12 and Ardbeg will leave school.

**Tip: Cursor selection**

You can select several students in one go moving the cursor over them and then either delete them or transfer them.

## 2.11.2 Transferring courses

As with students, there are three possible ways to do this:

The course will be offered to the same class as in the previous year  
In this case you do not need to do anything in Untis.

The course is transferred  
In this case the course is offered for a different class and no longer for last year's class.

The course is copied.  
The course is offered to the same class as last year and also to a different class.

The screenshot shows the 'New school year' dialog box. At the top, there are 'Prev. class:' and 'Class:' dropdown menus, both set to 12 and 13 respectively. Below these are 'Cancel' and 'OK' buttons. The main area contains two tables: 'Lessons' and 'Students'.

Lessons			
Subject	Les.	12 Prev. cl.	13 Class
peg1	78	12	
ch2	80	12	
it1	81	12	
e2	82	12	
re21	83	12	13
orc1	84	12 -> 13	
E2	85	[12] -> 13	
ar2	86	12	
E1	87		13
L1	88		13
Eco1	89		13
M1	90		13
RIN1	91		13

Students		
Students	12 Prev. cl.	13 Class
Aberfeldy Aberfeldy	[12] -> 13	
Aberlour Aberlour	12	
Aladdin Aladdin		13
Alice Alice		13
Ardbeg Ardbeg	12	
Ariel Ariel		13
Arran Arran	[12] -> 13	
Auchentoshan Auchentoshan	[12] -> 13	
Baghira Baghira		13
Balblair Balblair	[12] -> 13	
Balu Balu		13
Bambi Bambi		13
Bashful Bashful		13
Bernard Bernard		13

Sub.	Students	Tea.	Les.	Per	Cla.
peg1	24	Bach	78	2	12

The figure above illustrates the following situation:

Course orc1 has been copied, i.e. it is now offered to classes 12 and 13. Students who took the course last year and who have transferred will automatically be assigned to the course in class 13.

Course EN2 will be transferred, i.e. it will only be held for class 13 and no longer for class 12. In this case, student assignment is kept for students who have transferred.

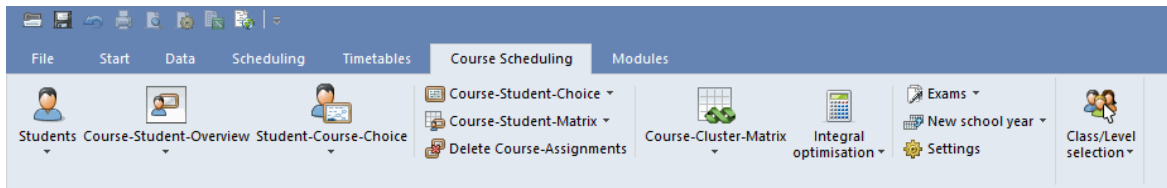
**Note: The same subject name in different class levels/years**

If you define the same subject name for courses in different class levels/years, course selections will be kept for students who transfer even if the course is given by a different teacher.

## 3 Course scheduling

The course scheduling module has all the functions of the students timetables module such as creating [students](#) and [courses](#) and [assigning courses](#) via the [course-student-overview](#) . Please read the corresponding points in section [Students timetables](#) .

On the 'Course scheduling' tab you will find all functions of the 'Student timetable' module and all additional functions of course scheduling .



The following points relating to course scheduling are explained in detail below:

- [Data input](#)
- [Scheduling tools](#)
- [Course optimisation](#)

The functions of [exam scheduling](#) are then explained.

### 3.1 Data input

The most important data items for course scheduling are:

- [Students](#)
- [Courses](#)
- [Course options](#) (selected courses and alternative courses)
- [Clusters](#)

#### 3.1.1 Students

Students General data input for students was explained in chapter '[Student master data](#)', section '[Students timetables](#)' .

This section explains only those functions relating to course scheduling:

The optimisation code

In addition to the general student data fields there is an additional 'optimisation code' input field for

course scheduling. You can use this field for [course optimisation](#) to determine which students should if possible be scheduled in the same [parallel course](#) or rather *not* scheduled in the same parallel course.

Name	Surname	First name	Number	Class	Male	Female	Opt. Code
Oban	Oban		S12001	12	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
Talisker	Talisker		S12002	12	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1
Lagavulin	Lagavulin		S12003	12	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
Laphroaig	Laphroaig		S12004	12	<input checked="" type="checkbox"/>	<input type="checkbox"/>	A
Scapa	Scapa		S12005	12	<input type="checkbox"/>	<input checked="" type="checkbox"/>	A
GlenOrd	GlenOrd		S12006	12	<input type="checkbox"/>	<input checked="" type="checkbox"/>	A
Clynelish	Clynelish		S12007	12	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
Bladnoch	Bladnoch		S12008	12	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1
Fettercairn	Fettercairn		S12009	12	<input type="checkbox"/>	<input checked="" type="checkbox"/>	A
Ardbeg	Ardbeg		S12010	12	<input checked="" type="checkbox"/>	<input type="checkbox"/>	A
Bowmore	Bowmore		S12011	12	<input checked="" type="checkbox"/>	<input type="checkbox"/>	A
Bunnahabain	Bunnahabain		S12012	12	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
Arran	Arran		S12013	12	<input checked="" type="checkbox"/>	<input type="checkbox"/>	A
Tobermory	Tobermory		S12014	12	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
GlenElgin	GlenElgin		S12015	12	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
Cardhu	Cardhu		S12016	12	<input checked="" type="checkbox"/>	<input type="checkbox"/>	A
Glenkinchie	Glenkinchie		S12017	12	<input type="checkbox"/>	<input checked="" type="checkbox"/>	A
Bruichladdich	Bruichladdich		S12018	12	<input checked="" type="checkbox"/>	<input type="checkbox"/>	A
Springbank	Springbank		S12019	12	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1

Enter the same number (0-9) for all students who are to be scheduled in the same parallel course. This allows you to retain the overall class that existed previously..

Codes A-Z have the opposite effect. Students with the same alphabetical code are assigned to different parallel courses, wherever possible.

### 3.1.2 Courses

The definition and creation of courses was described in chapter ' [Specifying courses](#) ', section ' [Students timetables](#) '. Please refer to that chapter for more details.

Parallel courses, i.e. equivalent course for a certain subject such as biology should be numbered sequentially. For example, if you have three equivalent biology course you should name them *bio1* , *bio2* and *bio3* or *bio01* , *bio02* and *bio03* .

#### **Note: Equivalent courses**

The optimisation algorithms recognise equivalent courses on the basis of their similar names (followed by a number)

You can best see possible courses in the [course-student-overview](#) .

## Course-student-overview

When the course scheduling module is used, the window on the left, the course window, provides the additional column "Choices" displaying the number of course choices where the course in question occurs.

There are also the additional fields of 'Min. No.' (minimum number of student) and 'Max. No.' (maximum number of students) . During course optimisation, Untis attempts to observe the minimum and maximum number of students for courses.

If you wish to edit student numbers simply click on the relevant field and enter the desired value. Alternatively, you can enter the values direct for the lessons (on the 'Lessons' tab under 'Lessons | Classes').

### 3.1.3 Course choices

#### Without alternative courses

If only module student timetables is available, the selected courses of a student must already be determined, i.e. it is not possible to enter alternative courses since it is only possible to enter whether a certain course has been chosen or not. This procedure was described in chapter [Course-student-overview](#) in section [Students timetables](#) .

#### With alternative courses

However, in many cases students can choose between several alternative courses. If the decision on one of these courses has not been made by the student or the course scheduler, the actual selection of a parallel course will then be made during course optimisation.

In this case, the application must be explicitly told which courses are actually the possible alternatives for a specific course option. Chapter [student-course-choice](#) describes how course options with alternative courses can be entered.

### 3.1.4 Course clusters

Courses which are to be scheduled in the timetable grid at the same time are in a so-called cluster. These clusters are also sometimes called blocks, and the term bands is also often used.

#### Cluster = band

In the 'Students timetables module, courses taking place simultaneously are combined in Untis into [clusters](#) . The clusters in course scheduling are nothing more than clusters.

The course scheduling module provides a comfortable tool for working with clusters, the [course-cluster-matrix](#) .

Subject	Les.	Per	Open periods	Teacher	Class(es)	Level	Stu.	1	2	3	4	5	6	7	8	9
BID1	91	5	0	Mend	13	13	10	X								
bio1	109	3	0	Foss	13	13	24				X					
CH1	92	5	0	Nobel	13	13	16		X							
ch1	110	3	0	Curie	13	13	7				X					
g1	95	4	0	Gri	13	13	26						X			
g2	96	4	0	Sutt	13	13	22						X			
g3	97	4	0	Grill	13	13	9						X			X
E1	87	5	0	Stan	13	13	24	X								
e1	98	3	0	Buck	13	13	19				X					
geo1	102	2	0	Stan	13	13	12				X					
H1	94	5	0	Tolk	13	13	7		X							
h1	101	2	0	Hero	13	13	25								X	
h2	100	2	0	Asim	13	13	25									X
re11	104	2	0	Mag	13	13	21									X
re12	105	2	0	Grill	13	13	9									

Subject	Les.	Type	Name	Stat. code(s)
E1	87	Stu.	Louie	
E1	87	Stu.	Crickett	
M1	90	Stu.	Dumbo	

You can see the available courses in the rows of the matrix and the existing clusters in the columns. The cells then indicate which course belongs to which cluster.

The [course-cluster-matrix](#) is described later in the section of the same name.

## 3.2 Scheduling tools

This section provides more details on the individual windows and functions of the course scheduling module. The following tools are available:

- [Course-student-overview](#) for the course scheduling module
- [Student-course-matrix](#)
- [Course-student-choice](#)
- [Course-student-matrix](#)
- [Course-cluster-matrix](#)

### 3.2.1 Course-student overview

Most functions of the course-student-overview were described in the [chapter of the same name](#) in section [Students timetables](#) .

The course scheduling module also offers you the option of [creating parallel courses](#) and [cancelling](#)

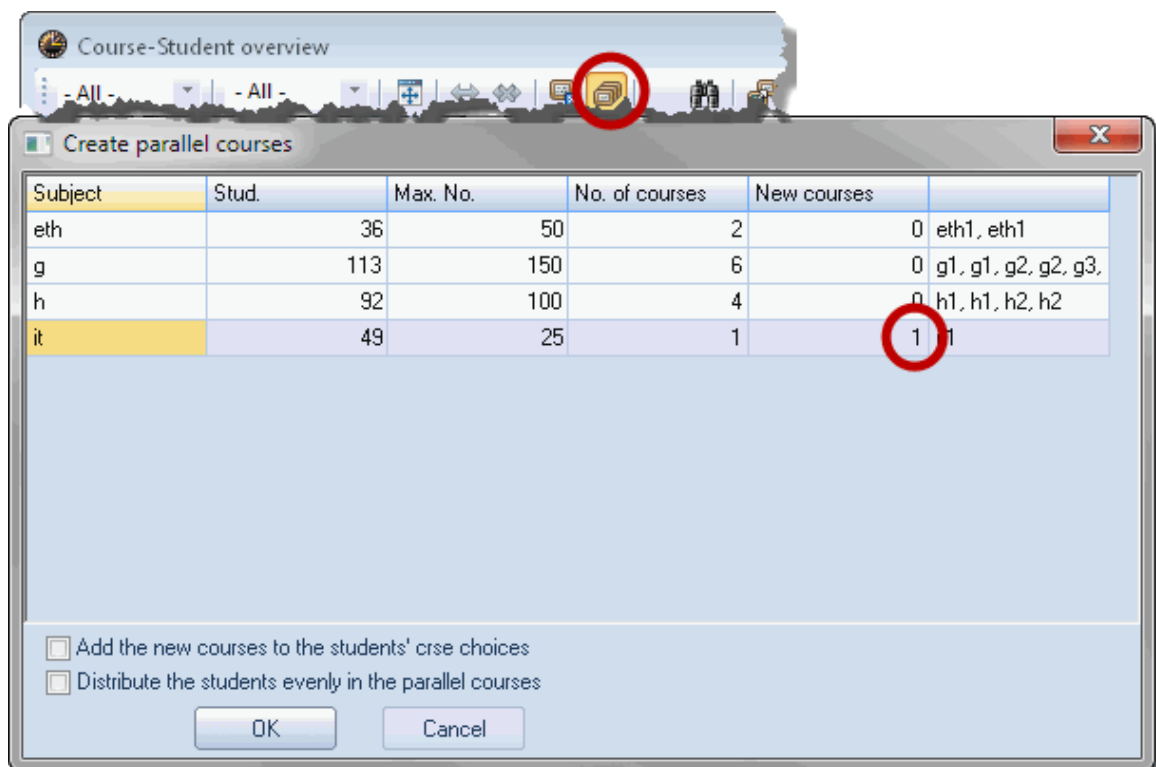


[courses](#).

### 3.2.1.1 Creating parallel courses

It can of course happen that you have to offer a particular subject in the form of several parallel courses due to a large number of registrations for the course (or, more precisely, the for course subject).

Use the <Create parallel courses> button in the course-student-overview in order to create additional parallel courses. This function opens a dialogue of the same name which displays the actual number and maximum allowed number of students for all the courses you have selected and which provides a proposal in the 'New course' column for the number of parallel courses that should be created. You can of course modify this proposal as you wish.



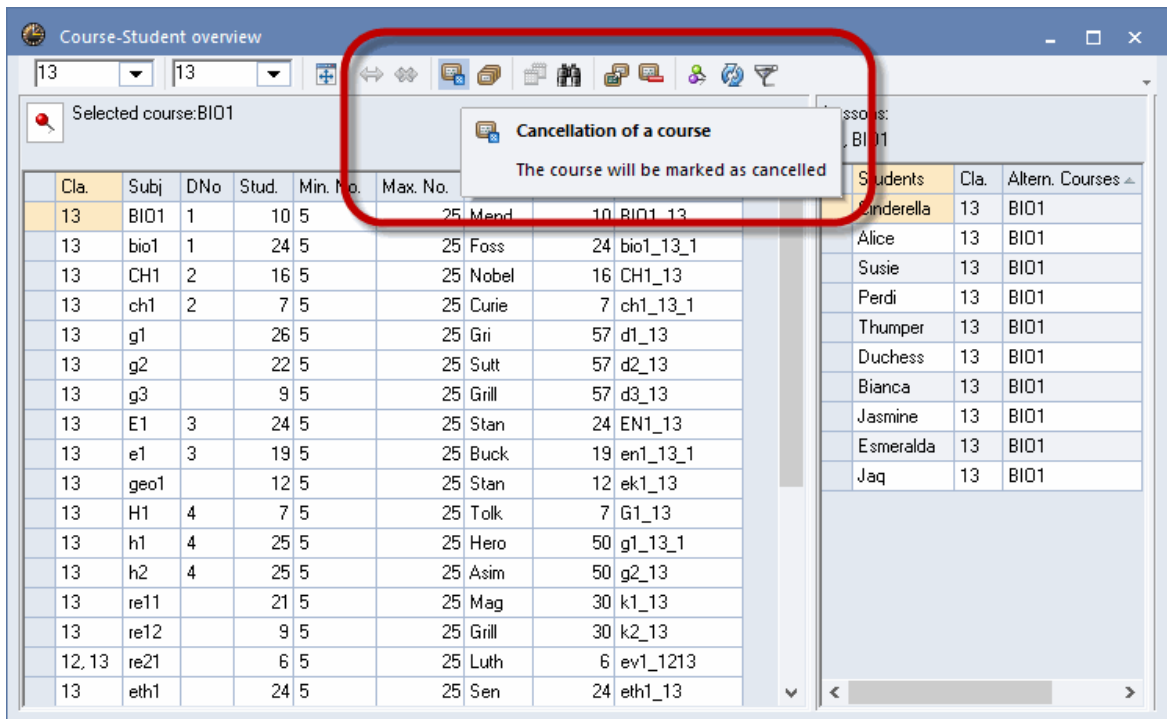
In the above example, a proposal is made to create two additional parallel course for the subject bio. 47 students have registered for it but there are only 20 places available. The names of parallel courses are generated in such a way by Untis by increasing the highest number behind the subject name by '1' (i.e. the original name is bio1 and then bio2 and bio3 are generated; original names are g1 and g2, g3 is then created anew).

**Note: Copying parallel courses to course choices**

If you check the box 'Add the new courses to the students' course choices', the newly created parallel courses will immediately be added to the corresponding student course choices.

### 3.2.1.2 Cancelling a course

Cancelling a yourself you wish to cancel a course using the button <Cancellation of a course> (without deleting the entire lesson), you must first have entered one or more alternative or [reserve courses](#) in the corresponding student course choices. In this case Untis will allocate all students who would have liked to take the cancelled course the reserve course entered first.



**Note: Cancelling reserve courses**

If additional reserve courses have been specified you can also cancel the first reserve course, and so on.

Technically speaking, this course will be *ignored*. If you wish to make this course available once more, uncheck the box on the 'Ignore' column in the lessons window.

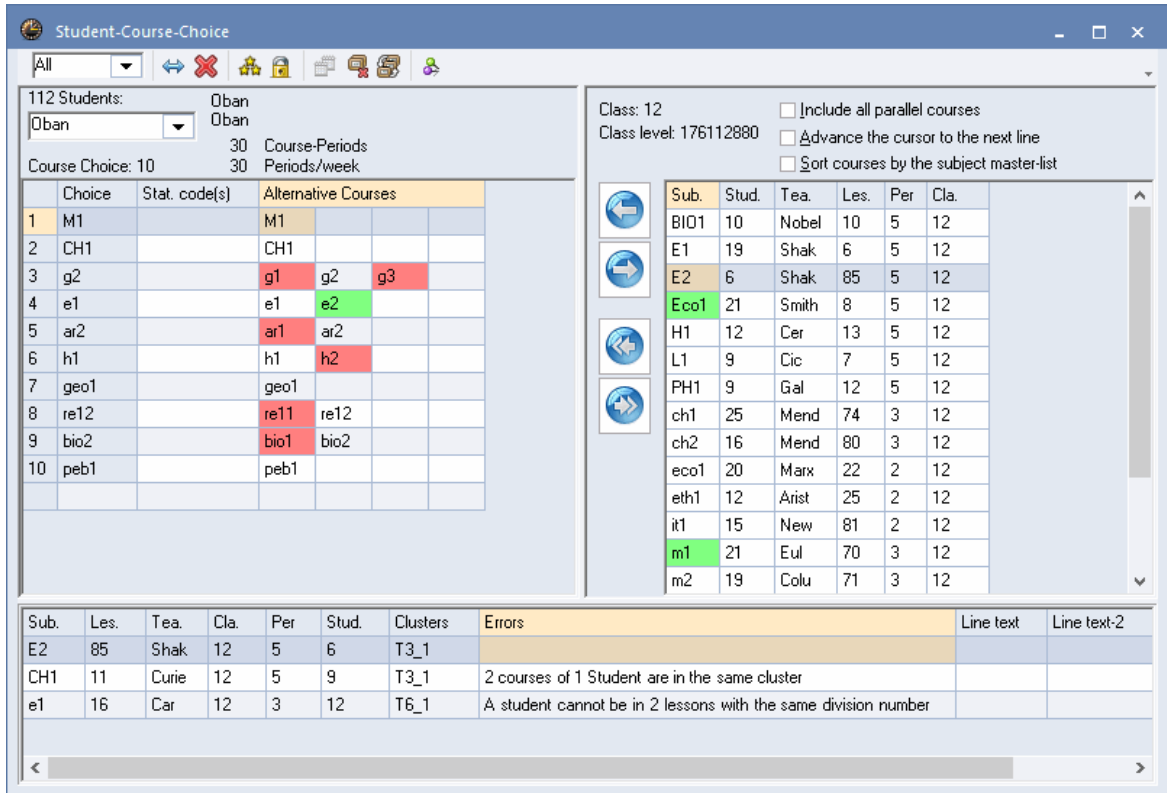
### 3.2.2 Student-course-choice

The student-course-choice window is used to assign courses to a student. The main difference to the course-student choice is that alternative courses can be specified here, too. It is not absolutely necessary to define which courses a student will actually take.

The window consists of the course choice area in the left pane, the course list in the right pane and the detail window at the bottom.

**Note: Restrict to class**

Use the combo box at the top left to limit the display to a particular class. The left window will then only display the students from the class, and only the courses allowed for the class will be offered for selection in the course list.



**Course list**

The course list shows all the courses which are available for the selected student, with the student’s class determining which courses are available. All courses which can actually be chosen, i.e. course without clashes, are highlighted green.

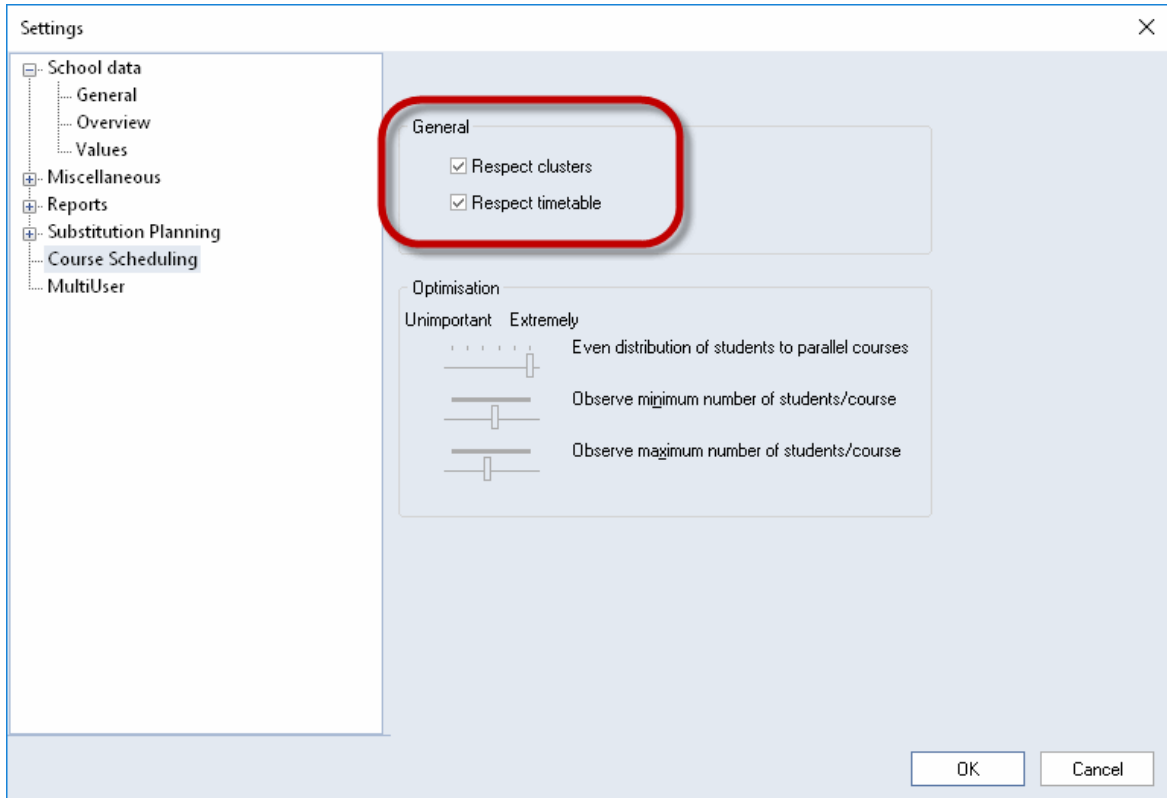
You can also sort the course list by any column in order to make course selection easier.

**Course choice window**

Each row of the course choice window displays one course choice of the currently active student. You can use the combo box at the top of the window to determine which student's course choices you wish to display and edit.

A course which has actually been chosen from the set of alternative courses, i.e. the course actually assigned to the student, is displayed in the 'Choice' column. You can also view possible courses in the [course-student-overview](#) . The other columns contain possible alternative courses for this course choice. Unfavourable courses are highlighted red, while appropriate (favourable) courses are highlighted green. The sequence of the alternative courses is not relevant.

**Note:**Without any additional settings, the Student-Course Choice will only show those conflicts which have an effect on creating the cluster. If you also want to see the conflicts which will arise due to periods already scheduled in the timetable, go to the *Course scheduling* tab, 'Settings' and check the box *Respect timetable* .



You can enter one or several codes of your choice for each course choice in the 'Stat.code(s)' column. These codes will be printed in the student-course-choice list and (optionally) in the course-students list and students-course list (printed from the [course-student-overview](#) ). They play an important role when scheduling exams (please refer also to the chapter ' [Exam scheduling](#) ' and to the notes on statistics codes in chapter ' [Course-students-choice](#) ').

### Course detail view

The course detail window displays additional data about the currently selected course such as teacher, weekly periods or [clusters](#) to which this course belongs. Furthermore, you will also see the courses that make the selected course a poor choice.

There are two reasons for a poor choice of course:

1. The course is in the same [cluster](#) as another course which is already assigned.
2. The course has the same [division number](#) as another course which is already assigned.

### Functions

You can perform the following functions in the student-course-choice:

- [Assign courses and alternative courses](#)
- [Select courses from alternative courses](#)
- [Create reserve courses](#)
- [Specify priorities](#)
- [Course choice combinations](#)

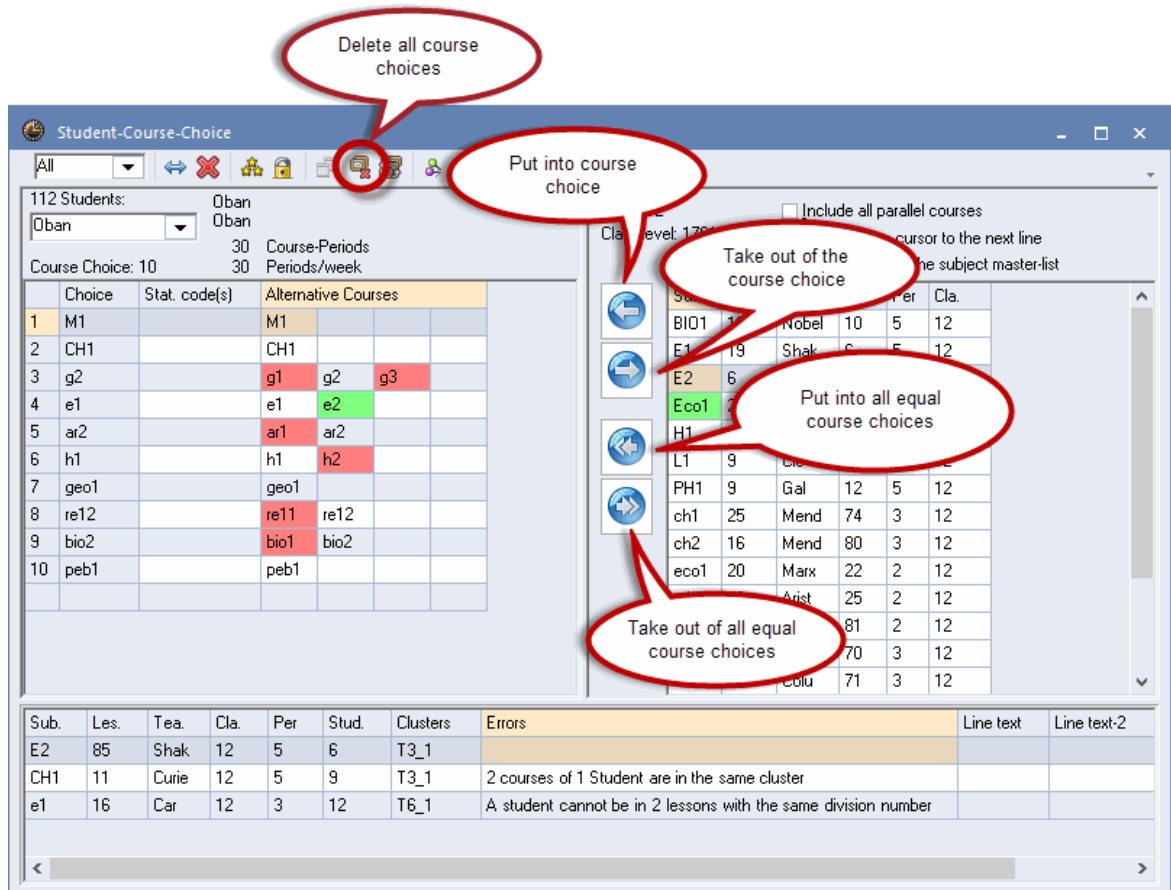
#### 3.2.2.1 Entering a course choice

You must first select a row in the course choice window in order to enter a course choice. Selecting an empty row opens a new course choice. Selecting a filled row allows you to add alternative

courses.

**Tip: Next row**

Checking the box 'Advance the cursor to the next line' will cause the cursor to move to the next row in the course choice window after a course is chosen.



**Adding a course to the course choice**

For assigning a course to a student, activate the last, empty row on the left side and then double-click on the course in the course list.

Or you go to the right side, select several courses and drag and drop them into the course choice on the left side. With this method every course is entered into a single row (without an alternative course).

**Note: With parallel course assignment**

Checking the box 'Include all parallel courses' causes any parallel courses to be transferred to the course choice window automatically. Parallel courses, i.e. courses with the same teaching content, can be automatically recognised in Untis by the same subject name (which may only be supplemented at the end by a number).

**Adding alternative courses to the course choice**

Now you can select alternative courses for course choices by selecting the respective row in the

course selection. Either you double-click on the respective course in the course list or you select one or more courses using the mouse and then clicking on the blue-framed arrow pointing to the left or using drag and drop to move them to a new row in the course choice window while pressing the left mouse-button.

### **Deleting alternative courses from the course choice**

If you wish to remove alternative courses from an existing course choice use the mouse to select the courses and then either press the blue-framed arrow pointing right or use drag and drop to pull the course(s) to the course list window. You can remove entire course choices in the same way.

### **Adding a course as an alternative course to all similar course choices**

However, if you make the course choice for only one student and click on the blue-framed multiple arrows pointing left, the selected courses will be added not just to the current students but also to all other students who have the same course choice. Course choices are considered to be the same if they contain the same alternative courses with the same course priorities as the selected course choice.

**Note:**

If the view has been limited to a particular class, the new alternative courses will only be added to students in this class.

### **Delete all course choices**

This function deletes the course choices of all students in the selected class(es).

**Warning:**

This function not only deletes all alternative course assignments, it also deletes all course choices. This means that no student in the selected class will have any course assigned after carrying out this function.

#### **3.2.2.2 Selecting an alternative course**

It is generally not always necessary to choose an alternative course. Course optimisation can automatically determine the most suitable course. However, you of course have the possibility of making a course choice manually.

##### **Assigning a course (to a student)**

In order to select an alternative course, i.e. to assign an alternative course to a student, simply double-click on the desired alternative course (in the course choice window). This course will be added to the "Choice" column.

Alternatively, you can perform course assignment using the corresponding toolbar button after selecting the desired course.

	Choice	Stat. code(s)	Alternative Courses		
1	M1		M1		
2	CH1		CH1		
3			g1	g2	g3
4	e1		e1	e2	
5	ar2				
6	h1				
7	geo1				
8	re12				
9	bio2				
10	peb1				

Click, Click

	Choice	Stat. code	Alternative Courses		
1	M1		M1		
2	CH1		CH1		
3	g3		g1	g2	g3
4	e1		e1	e2	
5	ar2		ar1	ar2	
6	h1		h1	h2	
7	geo1		geo1		
8	re12		re11	re12	
9	bio2		bio1	bio2	
10	peb1		peb1		

In the example above, course d3 was assigned with a double-click.

**Note: Assigning unfavourable courses**

You can also assign courses which are highlighted red if you confirm this by clicking <OK> in the appropriate message window.

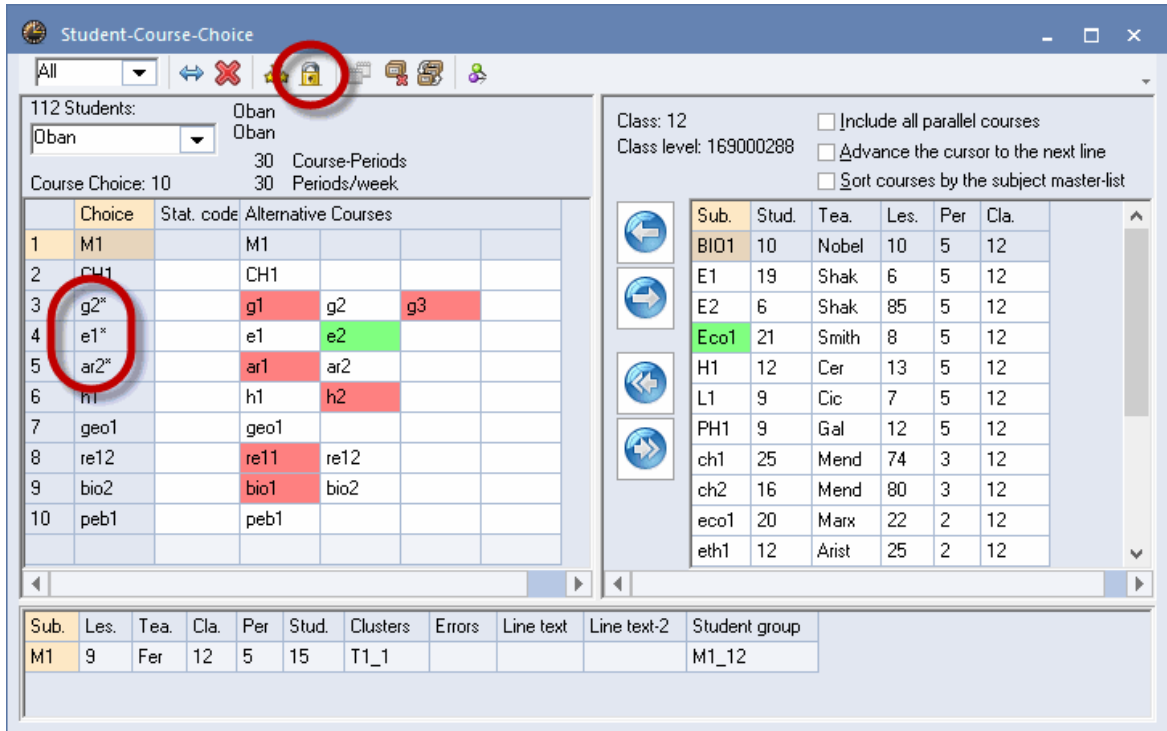
**Deleting a student/course assignment**

If you wish to remove a course assignment simply double-click on the chosen course in the "Choice" column or use the corresponding toolbar button.

Please note that you can only remove a course assignment if more than one alternative course has been entered in the course choice.

**Fixing the course choice**

A different alternative course may be assigned during course optimisation. If the course choice is to remain unchanged, you can fix it. Fixed course choices are marked with a \*.



The figure above illustrates the following situation:

- Courses in rows 1, 2, 7 and 10 are entered automatically since there is no alternative course.
- Courses in rows 3-5 have been selected and fixed.
- For each course rows 8 and 9 there is only one clash-free option.
- A choice can be made in row 6 between g1 and g2.

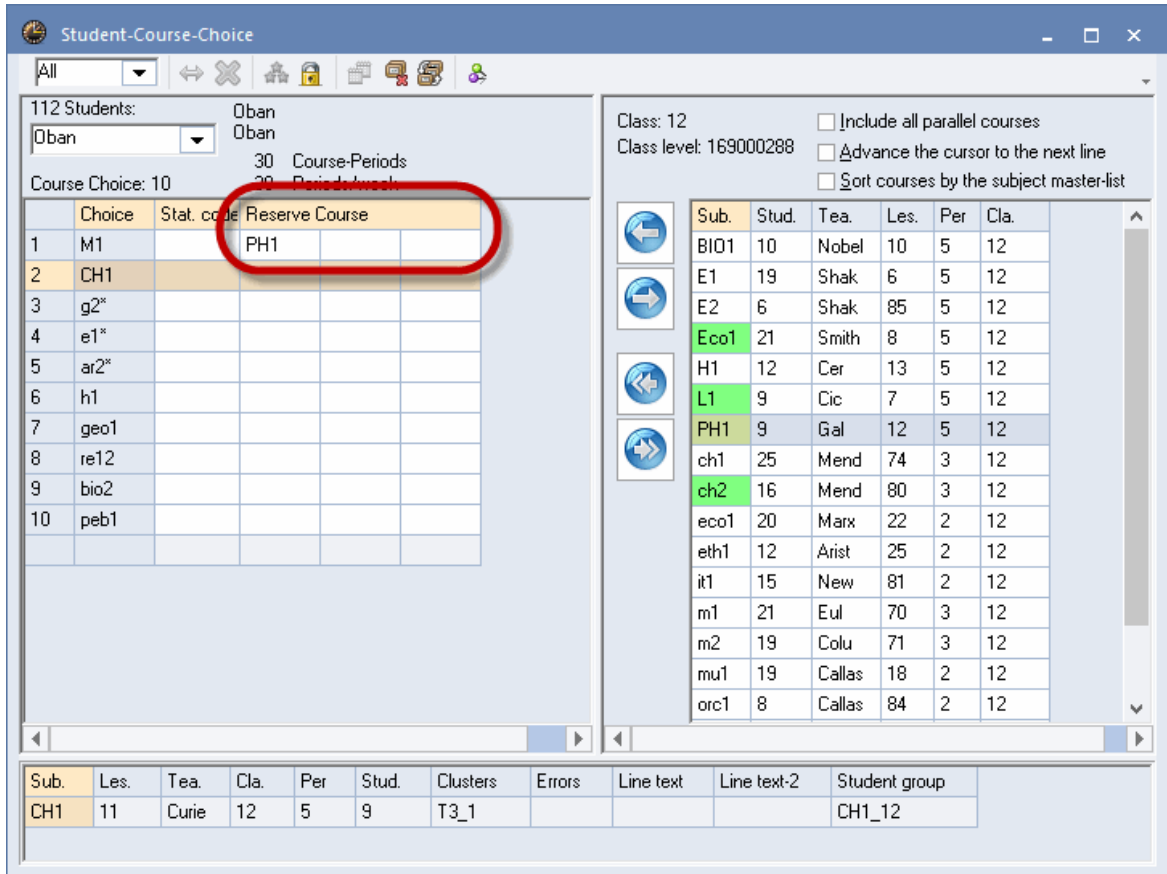
### 3.2.2.3 Reserve courses

Students can often make an initial choice if you require them to specify one or more reserve courses for all courses (or for courses that you know from experience are likely to have a low take-up). Once this choice has been made you as timetable scheduler will see from the number of students which courses have to be [offered more frequently](#) and which courses can be cancelled.

If you wish to enter reserve courses, right-click on the column heading 'Alternative Courses' in the left section of the [student-course-choice](#) window. This will switch to the display of reserve courses, and you can enter reserve courses in the same way as entering alternative courses.

If a course for which a reserve course has been entered is now cancelled, the reserve course will automatically be assigned to the students affected.



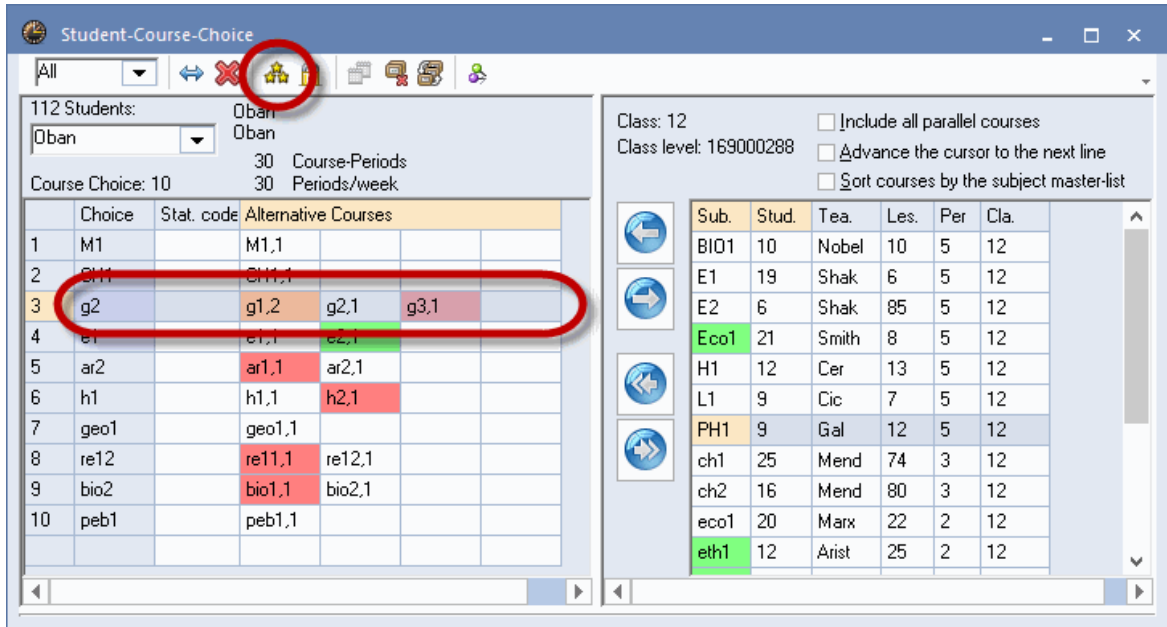


### 3.2.2.4 Priority

If a student has a preference for one of several alternative courses, you can manage this using the <Priority> button (function).

To change the priority of a course, select it and then click on this button. This decreases the priority of the course by 1. If, for example, the priority was originally 1, it will be changed to 2. The value is indicated after the subject name. Clicking on the <Priority (1-3)> button once more will change it to 3 and the next click would set the priority back to 1 again.

As soon as you have changed the priority of a course, the priority of all courses will be displayed behind the course names. If all courses have the same priority, no priority will be indicated.



In the above example, student Oban would prefer to take course *d2* while course *d1* is only considered as an alternative.

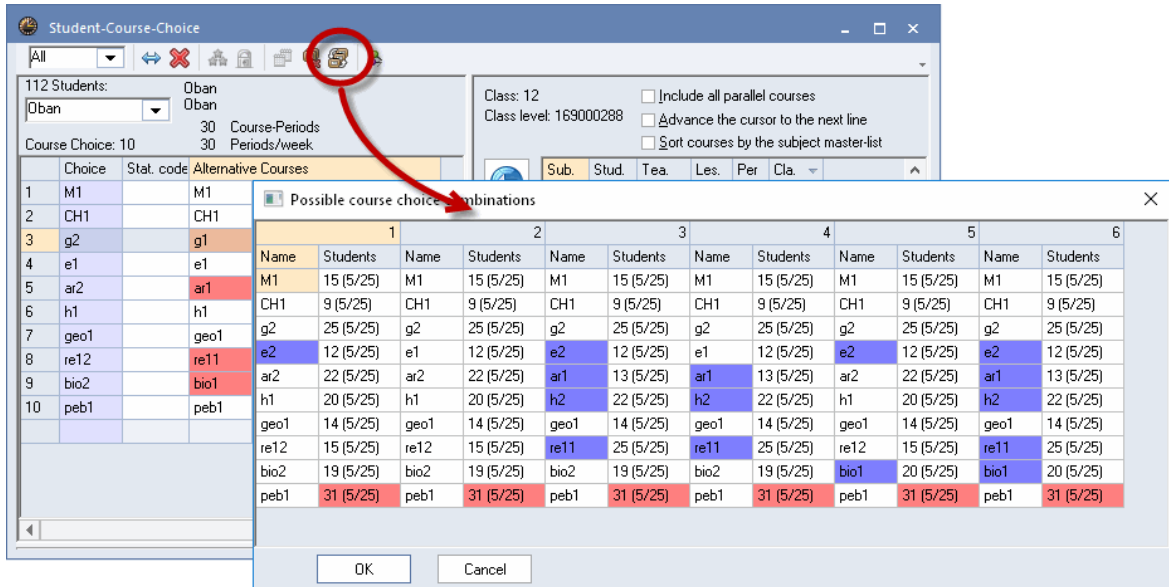
### 3.2.2.5 Course choice combinations

Clicking the <Course choice combinations> button opens the 'Possible course choice combinations' dialogue that displays all possible course choice combinations for the currently active student (in columns).

Any combination of course choices that does not result in a clash is possible. Changes vis-à-vis the current course choice are highlighted in colour (blue). A field will be highlighted in red if the defined number of students is exceeded or if this choice is not possible without any clashes in the current timetable.

The individual course choice combinations are sorted in such a way that the combinations listed first distribute the load more evenly over parallel courses than those listed lower down.

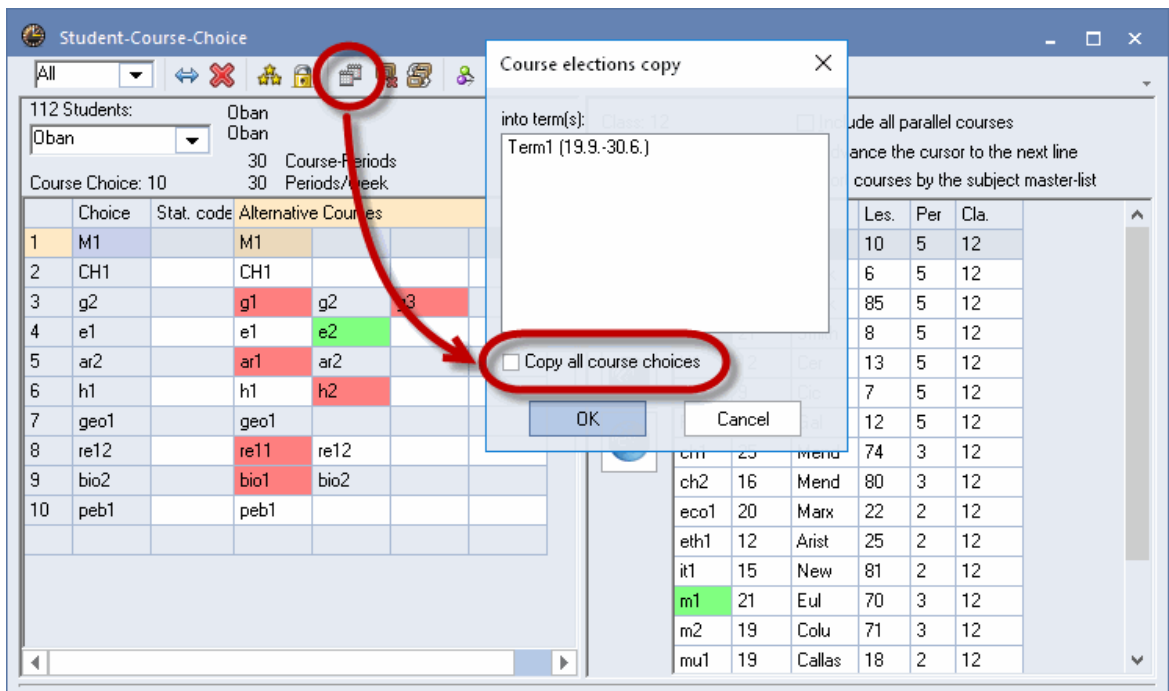
If you wish to adopt one of these alternative course choices simply click in the row in question and then on <OK>. This will assign the selected course choice combination to the student.



### 3.2.2.6 Copy Student-Course Choice

The <Copy to other terms> button allows you to copy the course choice of a student into other terms.

This can be done for all students at once. Check the box 'Copy all course choices' in the 'Copy course choices' window.



### 3.2.3 Course-student-choice

The course-student-choice window consists of two parts: the student list in the upper section and the course details in the lower section.

Choose alternative course

Fix course choice

Course-Student-Choice

13 All

Course: g1 / 95 - g1 Clusters: C13\_2, T12\_2 Cla.: 13 Tea.: Gri Stu.: 26

Alternative courses

Stu.	Cla.	Stat.	Course		
Bashful	13		g1	g2	g3
Dumbo	13		g1	g2	g3
Sleepy	13		g1	g2	g3
Cinderella	13		g1	g2	g3
Sneezy	13		g1	g2	g3
The tramp	13		g1	g2	g3
Mowgli	13		g1	g2	g3
Alice	13		g1	g2	g3
Baghira	13		g1	g2	g3
Susie	13		g1	g2	g3
Poppins	13		g1	g2	g3
Merlin	13		g1	g2	g3
Wart	13		g1	g2	g3
Kaa	13		g1	g2	g3
Wendy	13		g1	g2	g3
Ariel	13		g1	g2	g3
Pongo	13		g1	g2	g3
Thumper	13		g1	g2	g3
Flower	13		g1	g2	g3
Pinocchio	13		g1	g2	g3
Duchess	13		g1	g2	g3
Bianca	13		g1	g2	g3
Jasmine	13		g1	g2	g3

The selected cell

The course detail view for the selected cell

Sub.	Les.	Tea.	Cla.	Per	Stud.	Clusters	Errors	Line text	Line text-2	Student group
g1	95	Gri	13	4	26	C13_2, T12_2				d1_13

## Students list

The student list displays those students for the currently active course who have this course in their course choices.

In addition to the students' names, the window also lists their class, statistics code(s) and any alternative courses to this course choice.

**Note: Alternative courses**

If the 'Alternative courses' box is checked, all the students of the alternative courses will also be displayed.

The top screenshot shows the 'Course-Student-Choice' window with the following details:

- Course: g1 / 95 - g1
- Clusters: C13\_2, T12\_2
- Cl.: 13
- Tea.: Gri
- Les.: 95
- Stu.: 26
- Alternative courses

The table below shows the student list for this course choice:

Stu.	Cl.	Stat. code(s)	Course
Bashful	13		g1 g2 g3
Dumbo	13		g1 g2 g3
Sleepy	13		g1 g2 g3
Cinderella	13		
Sneezy	13		
The tramp	13		
Mowgli	13		
Alice	13		
Baghira	13		
Susie	13		
Poppins	13		
Merlin	13		
Wart	13		

The bottom screenshot shows the same window with the 'Alternative courses' checkbox checked (highlighted by a red circle). The student list is expanded to include:

Stu.	Cl.	Stat. code(s)	Course
Doc	13		g1 g2 g3
Bashful	13		g1 g2 g3
Grumpy	13		g1 g2 g3
Sneezy	13		g1 g2 g3
Dopey	13		g1 g2 g3
Sleepy	13		g1 g2 g3
Cinderella	13		g1 g2 g3
Happy	13		g1 g2 g3
Dumbo	13		g1 g2 g3
Bambi	13		g1 g2 g3
Pan	13		g1 g2 g3
Hood	13		g1 g2 g3
Mowgli	13		g1 g2 g3

The summary table at the bottom of the bottom screenshot is:

Sub.	Les.	Tea.	Cl.	Per	Stud.	Clusters	Errors	Line text	Line text-2	Student group
g1	95	Gri	13	4	26	C13_2, T12_2				d1_13

**Statistical codes**

You can enter one or more statistical codes in the 'Stat. code(s)' column for each student. These statistical codes play an important role in the context of [exam scheduling](#).

**Course detail view**

The detail window displays additional data about the currently selected course such as teacher, weekly periods or clusters to which this course belongs. Furthermore, you will also see the courses that make the selected course a poor choice.

**Choosing an alternative course**

This function enables you to specify an [alternative course](#) of a course choice as chosen course, i.e. assign this course to the student. Just select the requested course and then click this button. You can also make a selection by double-clicking.

## Fixing the course choice

You can use this function to explicitly fix the selected course of a course choice so that no change can be made to this course assignment during [course optimisation](#).

### 3.2.4 Course-student-matrix

The course-student-matrix, as its name suggests, provides an overview of which courses have been chosen by which students or which courses appear in the course choices of which students.

It contrasts students (columns) with courses (rows), with an entry at the intersection of the two indicating that the course appears in the student's course options.

The number in the cell indicates the number of the student's course choice. If a student's column contains several courses with the same number, this means that they are alternative courses.

An "X" at the intersection indicates that the course has been chosen by the student in question, i.e. it has been assigned to the student. These cells are also highlighted in blue.

Alternative courses are highlighted in either green or red depending on whether they are 'favourable' or 'unfavourable' for the student.

Course-Student-Matrix

Class level: All  
Subject/Les.: e1 / 16  
Students: 12

Class: All  
Students: Ardbeg

Only students with open course choices  
 Allow new subject choices

							1	2	3	4	5	6	7
							Aberfeldy	Aberlour	Ardbeg	Arran	Auchentoshan	Balblair	Bladnoch
Subje	Les.	Per	Teach	Class	Level	Stu.	12	12	12	12	12	12	12
ch1	74	3	Mend	12	12	25	09X	09	09		09		09
ch1	110	3	Curie	13	13	7							
ch2	80	3	Mend	12	12	16	09	09X	09X		09X		09X
g1	14	4	Goeth	12	12	18	03	03	03	03	03X	03	03
g1	95	4	Gri	13	13	26							
g2	15	4	Bach	12	12	25	03X	03	03	03	03	03	03X
g2	96	4	Sutt	13	13	22							
g3	97	4	Grill	13	13	9							
g3	115	4	Ander	12	12	12	03	03X	03X	03X	03	03X	03
E1	6	5	Shak	12	12	19		01X	01X		01X		
E1	87	5	Stan	13	13	24							
E2	85	5	Shak	12	12	6		01	01		01		
e1	16	3	Car	12	12	12	11X			04		04X	05X
e1	98	3	Buck	13	13	19							
e2	82	3	Buck	12	12	12	11			04X		04	05

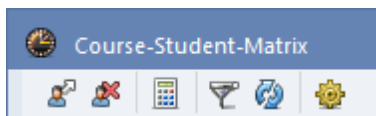
Subject	Les.	Stat. code(s)	Clusters
e1	16		T6_1

The course detail window at the bottom displays additional data about the currently selected course such as statistical codes or clusters to which this course belongs. Furthermore, you will also see the courses that make the selected course a poor choice.

The matrix generally displays all students and courses. However, you can use the combo boxes 'Class level' (year) and 'Class' as well as the check box 'Only students with open course choices' to restrict the display to specific students and courses.

### 3.2.4.1 Course-student-matrix functions

The following functions are available in this window:



#### Assign course

Use this button (or a double-click in the cell in question) to assign the selected alternative course to a course option or to change the current course assignment. If you activate the check box 'Allow new subject choices' in the settings for this window, you can also use this button to form new course options.

#### Delete assignment

In a similar manner to the previous function, you can use this button (or a double-click in the cell in question) to delete a course assignment. However, course choices cannot be deleted.

#### Optimisation of student allocation

You can also have courses assigned to students by automatic scheduling. Here you have the option of selecting students by year, class or individually.

This optimisation will only offer students class-free assignments, and efforts will be made to spread student numbers evenly over the courses.

#### Filter

Use the filter function to restrict the students displayed to those who have the currently active course in the course choice. If you activate the filter and e.g. click on the row with the course *bio2*, only the students will be displayed who have course *bio2* as an alternative course.

#### Refresh

This function enables you to refresh the window e.g. after changes to master data.

#### Settings

The settings dialogue allows you to determine whether new subject choices should be allowed (please refer also to the 'Assign course' function for this window) and whether student names should be displayed vertically or horizontally.

### 3.2.5 Course-cluster-matrix

The course-cluster-matrix window displays which courses are scheduled in which clusters and also serves to manage the clusters themselves as well as to manually schedule courses in clusters.

The window contrasts clusters (columns) with courses (rows). If a course has been scheduled in a certain cluster, the cell at the intersection of a course and a cluster contains an 'X' and is highlighted either blue or red. Blue highlighting indicates that the course causes no clashes with another course in the cluster (i.e. each teacher and each student is only assigned to one course in the cluster). Red highlighting shows that this course clashes with another course in the cluster.

A white cell indicates that the course cannot or should not be scheduled in the cluster represented by this column. This is the case when all the periods of this course have already been scheduled or when scheduling would cause conflicts with other courses in the cluster.

A yellow cell indicates that assignment would lead to clashes with the cluster conditions entered (please also refer to chapter ' [Parameters for optimisation](#) ').

A green cell means that the course can be scheduled in this cluster without causing clashes.

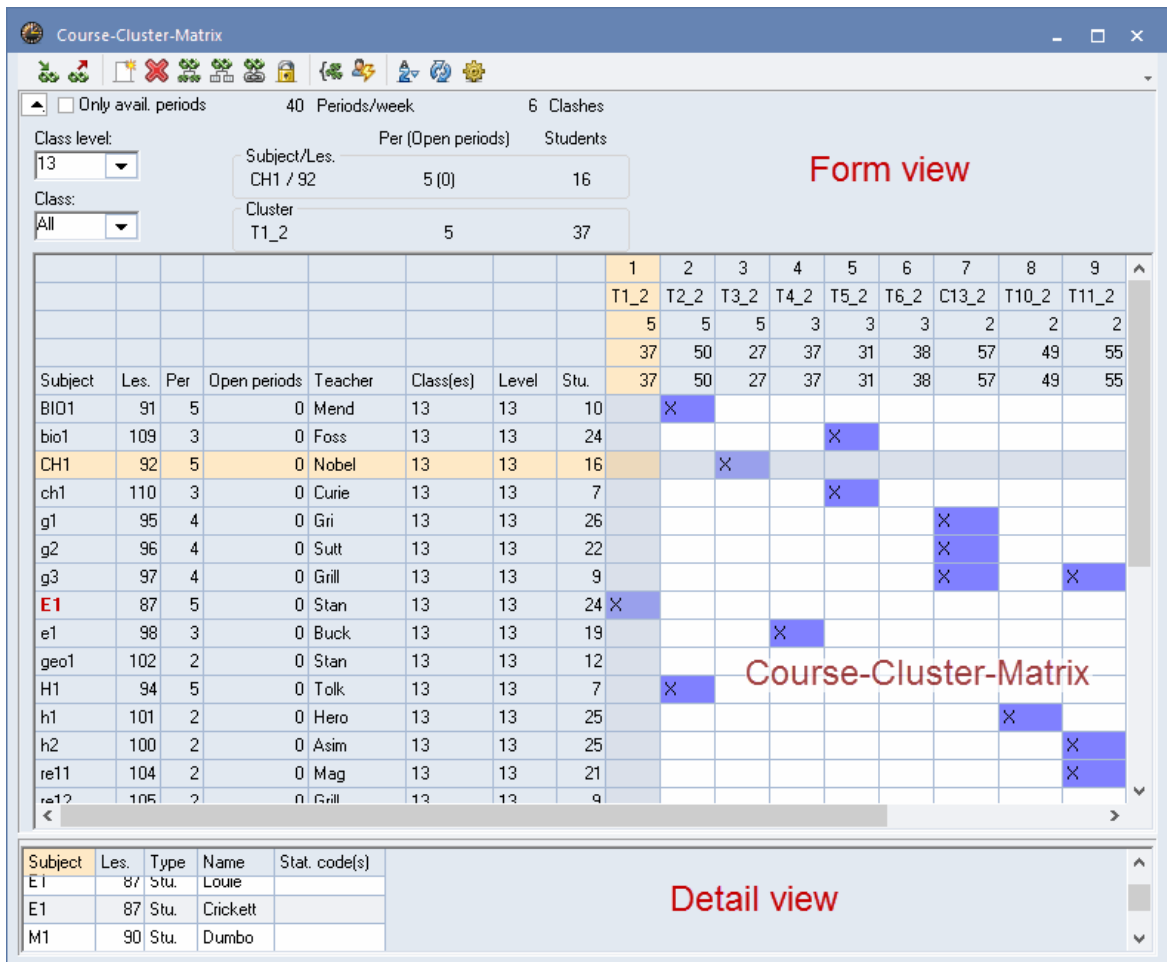
If you select a cell the weekly periods and the number of students of the current course and the current cluster are shown at the top of the window. In addition, the total number of weekly periods of all clusters and the number of clashes (i.e. the number of students that have already chosen another course in the same cluster) are also shown.



Information on the [layout](#) and [functions](#) of this window can be found below.

### 3.2.5.1 Window layout

The course-cluster-matrix is divided into three sections, the form window, the course-cluster matrix and the detail window.



### Form window

The form window displays all information about the active course and the cluster that it belongs to. You can limit the matrix to a particular class level / year or class

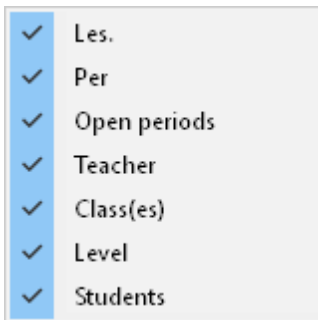
If you check box 'Only avail. periods', only those courses will now be displayed that still have open periods. Open periods are periods of a course that have not been scheduled in a cluster.

You can hide the top section of the course-cluster-matrix window if you need more room to display courses. To do this simply click on the black triangle pointing up at the top left of the window . If you wish to show the form window, click on the on the black triangle pointing down.

### Course-band-matrix

#### Courses

For every course a field with the subject name, lesson number, the number of weekly periods and open periods, teacher, classes, class level (years) and number of students is displayed.

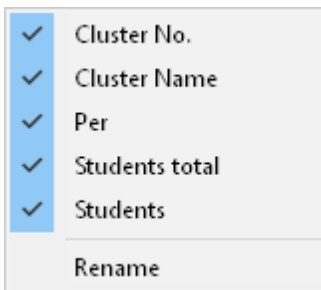


You can hide unneeded columns by right-clicking in the (grey) heading area. This opens a context menu which shows all available columns. Visible columns are checked. Clicking on a column name hides or displays the corresponding column.

Clicking on a column heading will sort the courses according to this column. The order of the columns can be rearranged by dragging them to the desired position. Likewise, you can adjust the width of the columns by dragging the column border in the heading line.

### Clusters

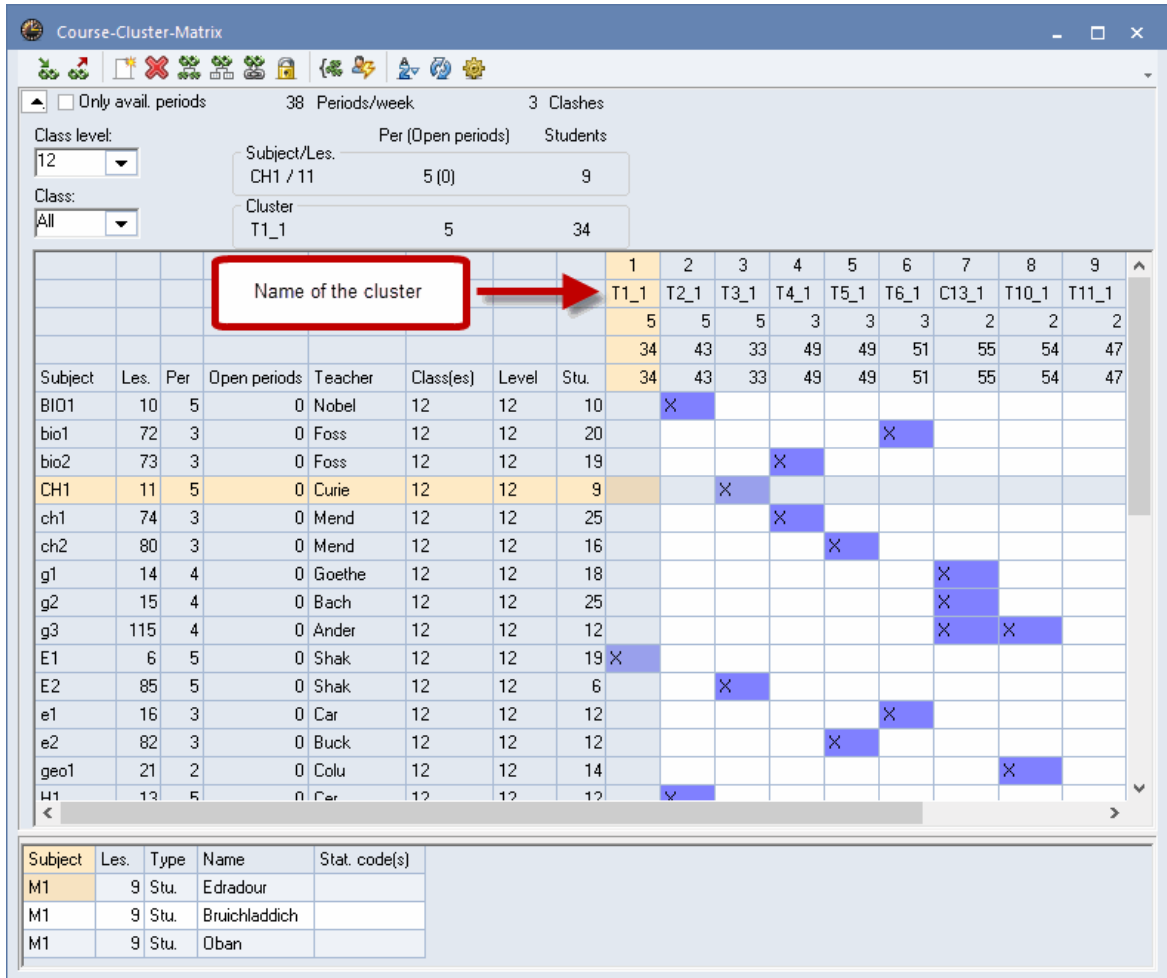
A row is displayed for each cluster containing the number and name of the cluster, the number of periods, the total number of assigned students (=total of all students who take at least one course in this cluster) and number of students (=total of students in the currently active class level or class who take at least one course in this cluster).



You can hide unneeded columns by right-clicking in the (grey) heading area. As with the columns, a context menu is displayed which can help you to hide heading lines.

### Detail window

Students causing clashes will be listed in the detail window at the bottom. The names of courses that clash will also be highlighted red. If the teacher of this course already teaches another course in this cluster, he/she will also be listed in the display of clashes and the teacher's name will also be highlighted red in the conflicting course.



The example above illustrates the following situation: If course BIO1 in cluster T4\_1 is scheduled there will be three student clashes, namely Bladnoch, Springbank and Auchentoshan.

**Note: Displaying alternatives**  
 As an alternative to displaying clashes, you can change the settings for the detail window to display all students who have at least one course in the cluster or to display all students without a course in the cluster.

**3.2.5.2 Course-cluster-matrix functions**

The following functions can be accessed via the toolbar of the 'Course-Cluster' matrix:



- [Add course to the cluster](#)
- [Remove course from the cluster](#)
- [Create new cluster](#)
- [Delete cluster](#)
- [Split cluster](#)
- [Divide cluster by class level](#)
- [Cluster to coupling](#)
- [Fix the cluster](#)
- [Merge similar clusters](#)

- [Display student clashes](#)
- [Refresh](#)
- [Matrix settings](#)

For the following functions you do not need a button:

#### Column width

You can change the width of the cluster columns by dragging the boundary of the right side of the first column to the width you want. Untis then adjusts all other column widths according to the first column. This column width is then saved.

#### Sort

Sorting according to the cluster columns is possible by clicking on the column heading as usually. Now all courses of this cluster are shown one after the other.

#### Rename

If you want to rename a cluster, right-click in the row with the cluster name and then chose 'Rename' in the context menu. Now you can change the name of the cluster in the field.

#### Changing the number of periods per week

If you want to change the number of periods per week of a cluster, right-click in the row of the weekly periods and chose 'Change weekly periods' in the context menu.

#### Note: Weekly periods cannot be changed arbitrarily

Please note that weekly periods of clusters with courses cannot be changed arbitrarily. You always can decrease the number of periods. As a consequence the unscheduled periods of the allocated courses rises. Increasing the number of cluster periods is only possible if all allocated courses of the cluster have sufficient unscheduled periods for the increase.

### 3.2.5.2.1 Create/delete/split cluster

#### Create new cluster



If you wish to create a new cluster, simply press the 'Create new cluster' button. Untis will create an empty cluster with 0 periods. As soon as you assign a course to the cluster this number will be adjusted to the number of open periods of the course. You can also enter and change the number of weekly periods in the cluster yourself.

#### Note: Cluster = simultaneous sequence of lessons

Since a cluster is actually a simultaneous sequence of lessons, you will also find the new cluster in the 'Lesson sequences' window.

#### Delete cluster



You can delete a cluster by selecting the desired cluster and then clicking on the 'Delete cluster' button.

### Split cluster/Scheduling conditions



Use this function to split a cluster containing several periods, for example a 5-period cluster can be split into a 3-period and 2-period cluster.

When you click on this icon, a dialogue pops up where you can additionally allocate double periods or block conditions or lesson groups to all lessons of the cluster.

**Cluster-Split** ✕

	Old cluster	New cluster 1	New cluster 2
Cluster Name:	T1_1	T1_1	T1_3
Periods/week:	5	<input type="text" value="3"/>	<input type="text" value="2"/>
Double periods:	0	<input type="text" value="0"/>	<input type="text" value="1"/>
period block:	0	<input type="text" value="3"/>	<input type="text" value="0"/>
Lesson group:		<input type="text" value="WA"/>	<input type="text" value="WA"/>

Include copies of the courses in the new cluster

The impact of this function are certainly reflected in the lesson windows:

L-No.	Cl,Te.	Teacher	Subject	Class(es)	Home room	Double pers.	Block	Codes	Les. group	LG-Distrib	Clusters
120	(c)	Fer	M1	12	r12	1-1		(T)	WB	<input type="checkbox"/>	T1_3
9	(c)	Fer	M1	12	r12		3	(T)	WB	<input type="checkbox"/>	T1_1
6	(c)	Shak	E1	12	r12		3	(T)	WA	<input type="checkbox"/>	T1_1
118	(c)	Shak	E1	12	r12	1-1		(T)	WA	<input type="checkbox"/>	T1_3

If you want to have the possibility to add scheduling conditions to the lessons of the cluster without splitting the lessons, then uncheck the box 'Include copies of the course in the new cluster'. If this box is checked the existing lessons will always be split in several lessons with different lesson numbers.

### Split cluster by year/level



Use this function to split a cluster containing courses from class levels (years) into several clusters containing courses for a single class level (year). Please refer to section '[Optimisation for several class levels \(years\)](#)' for more information on this function

### 3.2.5.2.2 Adding and removing courses

#### Add course to the cluster



There are the several ways of scheduling a course in a cluster:

- Select the cell concerned and click on the <Add course to the cluster> button
- Double-click on the cell at the intersection of course and cluster
- Select the cell concerned and entering the key 'X' or 'x'.

#### Note: Scheduling with clashes

An appropriate warning will be displayed if scheduling a course in a cluster is going to cause a clash. You can still schedule the course by confirming the message with <OK>. A course without open periods can of course not be scheduled.

If the course has fewer open periods than the cluster has periods/ week, you will be asked if you wish to split the cluster. If you confirm this, two new clusters will be created from the original cluster and will contain all the courses assigned so far. The number of periods/week in the original cluster will be reduced to the number of open periods of the course being added, and the course is also added to the cluster. The second cluster "inherits" the remaining number of weekly periods and contains only the previous courses.

#### Remove course from the cluster



There are the several ways of removing a course from a cluster:

- Select the cell concerned and click on the button <Remove course from the cluster>.
- Double-click on the cell at the intersection of course and cluster
- Select the cell concerned and press the <DEL> or <SPACE> key.

#### Tip: Removing several courses

You can remove several courses from their cluster at the same time. First select the desired cells and then click on the button "Remove course from the cluster" or <Remove course from the cluster> button or press the <DEL> or <SPACE> key.

### 3.2.5.2.3 Cluster to coupling

This function in the course-cluster-matrix allows you to convert the selected clusters to couplings. Please also refer to the application notes in section 'Course scheduling and clusters in timetable scheduling'.



Conversely, you can convert existing couplings back to courses via menu item 'File | Auxiliary Functions | Coupl. to Less.-Sequ.'.

**Note: converting unscheduled lessons**  
At the time of the transformation, the lessons affected by this involved should not yet be scheduled in the time grid.

### 3.2.5.2.4 Fix the cluster

This function locks a cluster, i.e. no courses will be removed from the cluster during [course optimisation](#) . However, you can allow course optimisation to add courses to a locked cluster .



Fixed (locked) clusters are indicated a \* next to the cluster number and by a grey background.

								4	*5	6	*7	8	9	10	11	12	13
								T4_	T5_1	T5_2	C13_1	T10_1	T11_1	T12_1	T7_1	T8_1	T9_1
								3	3	3	2	2	2	2	2	2	2
								49	49	51	55	54	47	55	55	58	52
Subject	Les.	Per	Open periods	Teacher	Class(es)	Level	Stu.	49	49	51	55	54	47	55	55	55	52
ch2	80	3	0	Mend	12	12	16		X								
e2	82	3	0	Buck	12	12	12		X								
m1	70	3	0	Eul	12	12	21		X								
g1	14	4	0	Goethe	12	12	18				X		X				
g2	15	4	0	Bach	12	12	25				X						X
g3	115	4	0	Ander	12	12	12				X	X					
BI01	10	5	0	Nobel	12	12	10										
bio1	72	3	0	Foss	12	12	20			X							

**Note: Fixed (locked) clusters**  
Fixed clusters will also normally remain unchanged during timetable optimisation, i.e. all courses in a fixed cluster will also be scheduled at the same time. Please also refer to the application notes in section 'Course scheduling and clusters in timetable scheduling'.

### 3.2.5.2.5 Merge similar clusters

This function searches for cluster assigned exactly the same courses. If such clusters are found, they are merged to form a single cluster with the same number of periods/week as the original clusters.



### 3.2.5.2.6 Display student clashes

This function shows the number of student clashes that would be caused if the course(s) were scheduled in the cluster in question. Teacher clashes are indicated by a '-' (hyphen).



You can use this function, for example, if you wish to remove a cluster with few courses and are now searching for other clusters to which you can assign these courses. You can then see at a glance which assignments would cause the fewest student clashes and consequently the fewest changes in student choices.

Course-Cluster-Matrix

Only avail. periods: 76 Periods/week, 0 Clashes

Class level: All

Subject/Les.: BIO1 / 10, Per (Open periods): 5 (0), Students: 10

Class: All, Cluster: T2\_1, Per: 5, Students: 43

								1	2	3	4	5	6	7	8	9	10
								T1_2	T2_1	T2_2	T3_1	T3_2	T1_1	T4_1	T4_2	T5_1	T5_2
								5	5	5	5	5	3	3	3	3	3
								37	43	50	33	27	34	49	37	49	31
Subject	Les.	Per	Open periods	Teacher	Class(es)	Level	Stu.	0	43-	0	7	-	3	8	0	10	0
BIO1	10	5	0	Nobel	12	12	10	0	0	0	7	-	3	8	0	10	0
BIO1	91	5	0	Mend	13	13	10	4	0	0	0	6	0	-	5	-	2
CH1	92	5	0	Nobel	13	13	16					X					
bio1	72	3	0	Foss	12	12	20										X
bio2	73	3	0	Foss	12	12	19							X			
ch1	11	5	0	Curie	12	12	9				X						
ch1	74	3	0	Mend	12	12	25						X				
ch1	110	3	0	Curie	13	13	7										X
ch2	80	3	0	Mend	12	12	16									X	
g1	14	4	0	Goethe	12	12	18										
g1	95	4	0	Gri	13	13	26										
g2	15	4	0	Bach	12	12	25										
g2	96	4	0	Sutt	13	13	22										
g3	97	4	0	Grill	13	13	9										
g3	115	4	0	Ander	12	12	12										

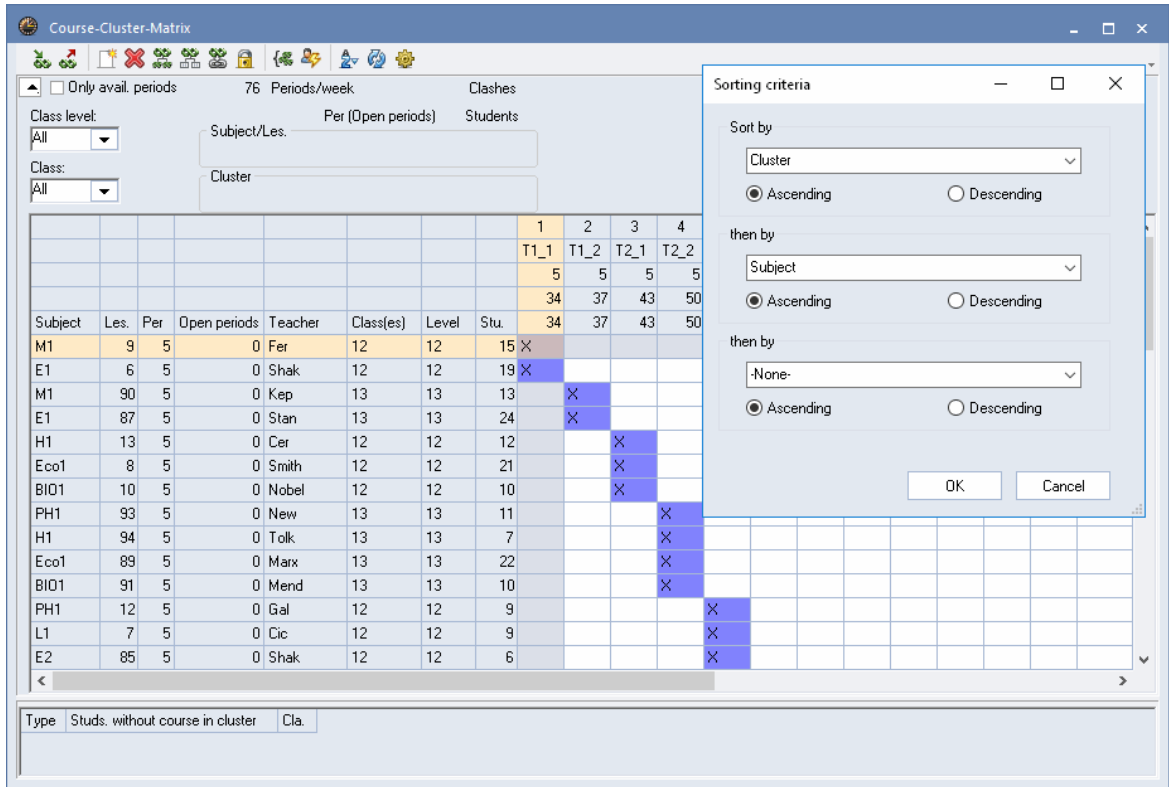
### 3.2.5.2.7 Sort

#### Sort



Use this function to pre-sort the course-cluster matrix by default.





Please note that sorting has an impact on the order of the courses within a cluster. You can change the order of the clusters displayed under < [Settings](#)>.

### 3.2.5.2.8 Refresh - Settings

#### Refresh

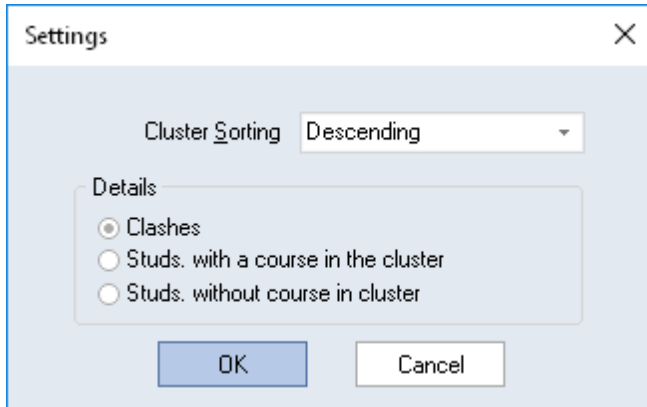


This function enables you to refresh the window e.g. after changes to master data.

#### Settings



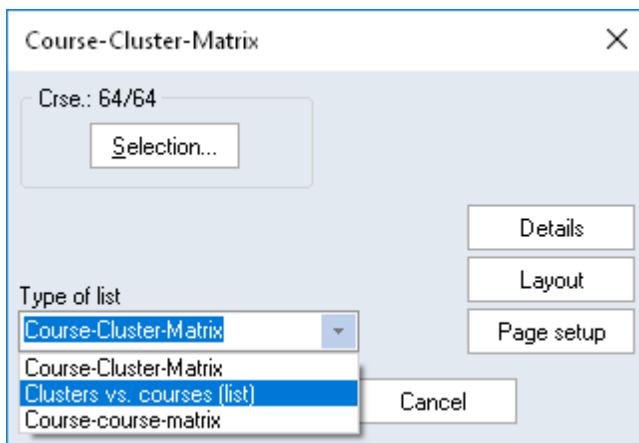
The settings dialogue allows you to determine the sort order of the clusters.



You can also determine whether all clashes of a cluster, all students with a course in the cluster or all students without a course in the cluster should be displayed in the detail window.

### 3.2.6 Printing

The course-cluster-matrix window provides a number of lists for you to print or display by selecting the <Print> or <Print preview> buttons from the main toolbar.



#### Course-cluster-matrix

The course-cluster-matrix is always printed in the form that is displayed on the screen. The same column and row headings are printed as in the screen display.

If student clashes (please refer to section 'Display student clashes' in the section above) are currently displayed in cells when the print command is called, they will also be printed.

#### Cluster vs. courses list

This list shows the name of all courses contained in each cluster with the relevant number of students.

You can limit the output to certain courses by entering one or more statistical codes in the detail settings.

#### Course-course-matrix

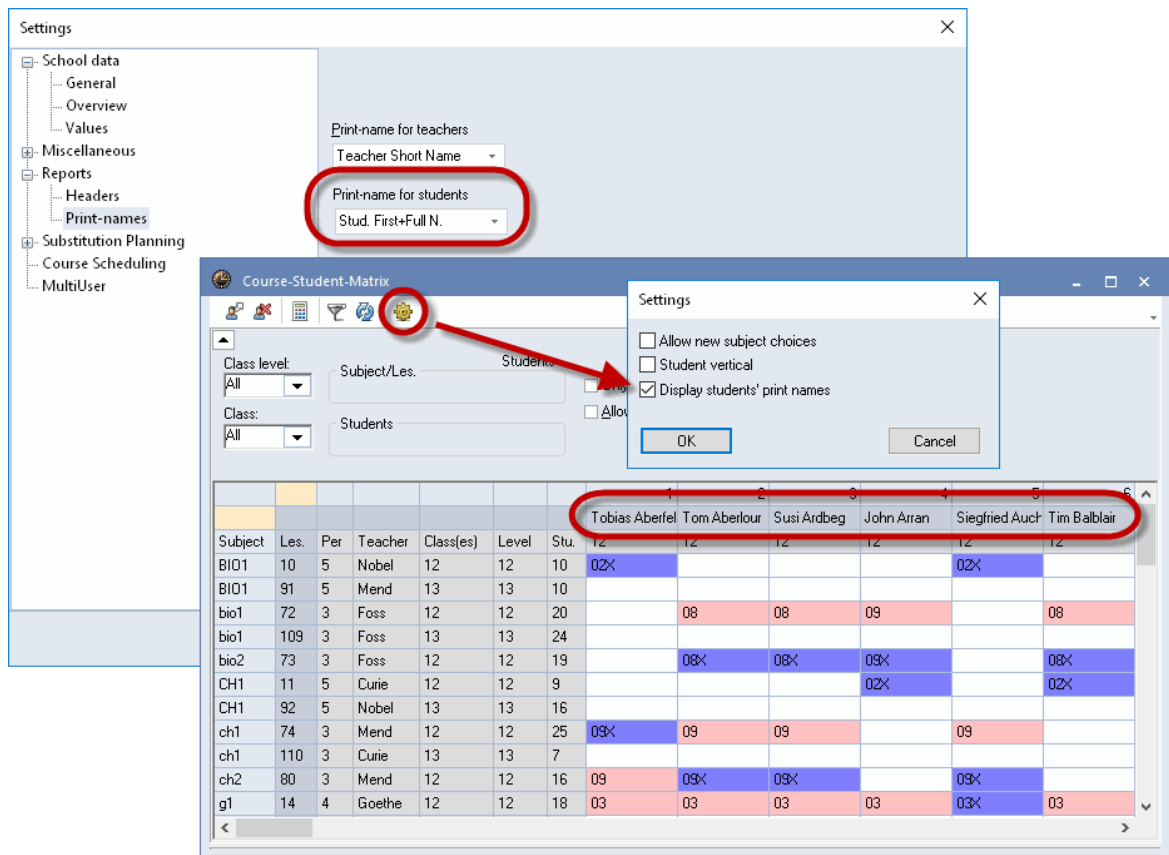
The course-course matrix shows you how many students take two different courses at the same time. It thus indicates how many student clashes would result if the two courses were scheduled simultaneously in a cluster.

Any clashes resulting from a possible assignment of alternative courses are also shown in parentheses.< br>

### StudentPrint names

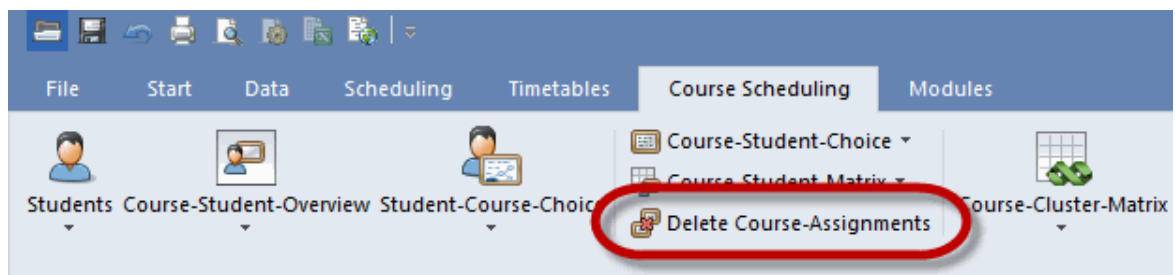
In the general <Settings> go to 'Reports | Print names' to determine a so-called *Print name* for students. Here you can define, e.g. that the first and the surname are shown or printed by default instead of the short name.

This setting is respected e.g. in the 'Course-Student Choice' window and the 'Course-Student matrix' window, provided that you checked the box 'Display students' print names' in the <Settings> of the respective window.



### 3.2.7 Delete course assignments

assignments' to delete the course assignments for all students of a class or class level/year, or of all students. The selected course is removed in the case of course choices with several alternative courses.



### 3.3 Course optimisation

The two main tasks of course scheduling are to define course clusters, i.e. determine which courses should best be taught at the same time, and to allocate students to actual courses when several

alternative courses are specified in their course choices.

Several constraints must be taken into account:

- No teacher may teach two different courses within the same [cluster](#) .
- No student should take two different courses within the same [cluster](#) , otherwise choices must be redefined
- Clusters should be formed in such a way that as many students as possible take a course in this cluster.
- Clusters should be generated in such a way that as many students as possible attend a course in this cluster.
- Students should be allocated to [parallel courses](#) as evenly as possible, e.g. course bio1 should not be taken by 40 students when the parallel course, bio2, is only taken by 10 students. At the same time, [alternative courses](#) requested with a higher priority by students should be given preferential treatment during assignment.

The course scheduling module provides two different optimisation methods for this purpose: Integral optimisation and partial optimisation (also called part optimisation).

### **Integral optimisation**

[Integral optimisation](#) schedules all courses as clusters by one click only, and the students are assigned to alternative courses.

### **Partial optimisation**

In contrast, [partial optimisation](#) only deals with a part of the courses which have to be scheduled. The scheduler thus has better control over the combination of the clusters. The use of partial optimisation usually requires a certain level of experience and good knowledge about the scheduling situation of the school.

In practice, it often is advisable to manually schedule (and lock) parts of the courses by the means of the [course-cluster-matrix](#) , and to bring in additional personal knowledge and experience before the optimisation run.

### **Example**

For example, taking an ethics or religious education lesson may be compulsory for students of a particular class level/year. They may have to take one of the three English courses on offer. Your specialist knowledge of these matters must underpin your scheduling activities. In many cases manually scheduling these courses in a cluster (and then locking the cluster) will speed up subsequent optimisation significantly and greatly improve the quality of the solutions.

## **3.3.1 Parameters for optimisation**

There are a number of parameters that need to be observed in course scheduling that quite naturally have to be taken into consideration by course optimisation. The following section explains the requirements in more detail.

### **Minimum and maximum number of students**

For each course you can specify the minimum and maximum number of students who should take

the course.

The data can be entered either in the [course-student-overview](#) or directly in the lessons window and is described in more detail in chapter [Courses window](#) in this manual.

### Student optimisation code

The student optimisation code allows you to specify which students should be scheduled in the same parallel course and who should if possible be scheduled in different parallel courses. The optimisation code is entered in the student master data window and is explained more in greater in the '[Student master data](#)' section of this manual.

### Cluster conditions

Go to the 'Course scheduling tab', click on 'Integral optimisation' button and select 'Cluster conditions'. A window will pop up where you can set restrictions on the creation of clusters during courses optimisation.

Enter conditions in the left part of the cluster conditions window. The right section of the window displays the list of possible courses that can be included in the conditions.

The details window at the bottom shows additional data on the selected course when the focus is on the course list.

Conditions that are violated by existing clusters are highlighted red. The detail window will show you the reason(s) for the clash when you click on the condition in question.

Number of Condit.	Max. Courses	Not In clus	Conditioned courses		
1	2		BIO1	CH1	PH1
2		3	d1	d2	d3
3		2	e1	e2	

Sub.	Stud.	Tea.	Les.	Per	Cl.
bio1	20	Foss	72	3	11
bio1	24	Foss	109	3	12
BIO1	10	Mend	91	5	12
bio2	19	Foss	73	3	11
ch1	25	Mend	74	3	11
ch1	7	Curie	110	3	12
CH1	16	Santi	92	5	12

Sub.	Stud.	Tea.	Les.	Per	Cl.	Clusters	Errors
BIO1	10	Santi	10	5	11	T2_1	
CH1	9	Curie	11	5	11	T3_1	
PH1	9	Gal	12	5	11	T3_1	

In order to create a new condition you first have to select an empty cell in the left part of the window. Now add one or more courses to the condition (in a similar way to the '[student-course-choice](#)' window) either by double-clicking on the desired course(s) or by clicking on the blue-framed arrow.

You can use the other blue-framed arrow (pointing to the right) to remove courses from a rule.

The following two cluster condition options are available:

### Maximum courses from one cluster

Only a certain number of courses from a group of specified courses may be scheduled in one cluster.

Cluster condition 1 in the above example: A maximum of two courses from BIO1, CH1 and PH1 may be in one cluster.

### Not in cluster with specific course

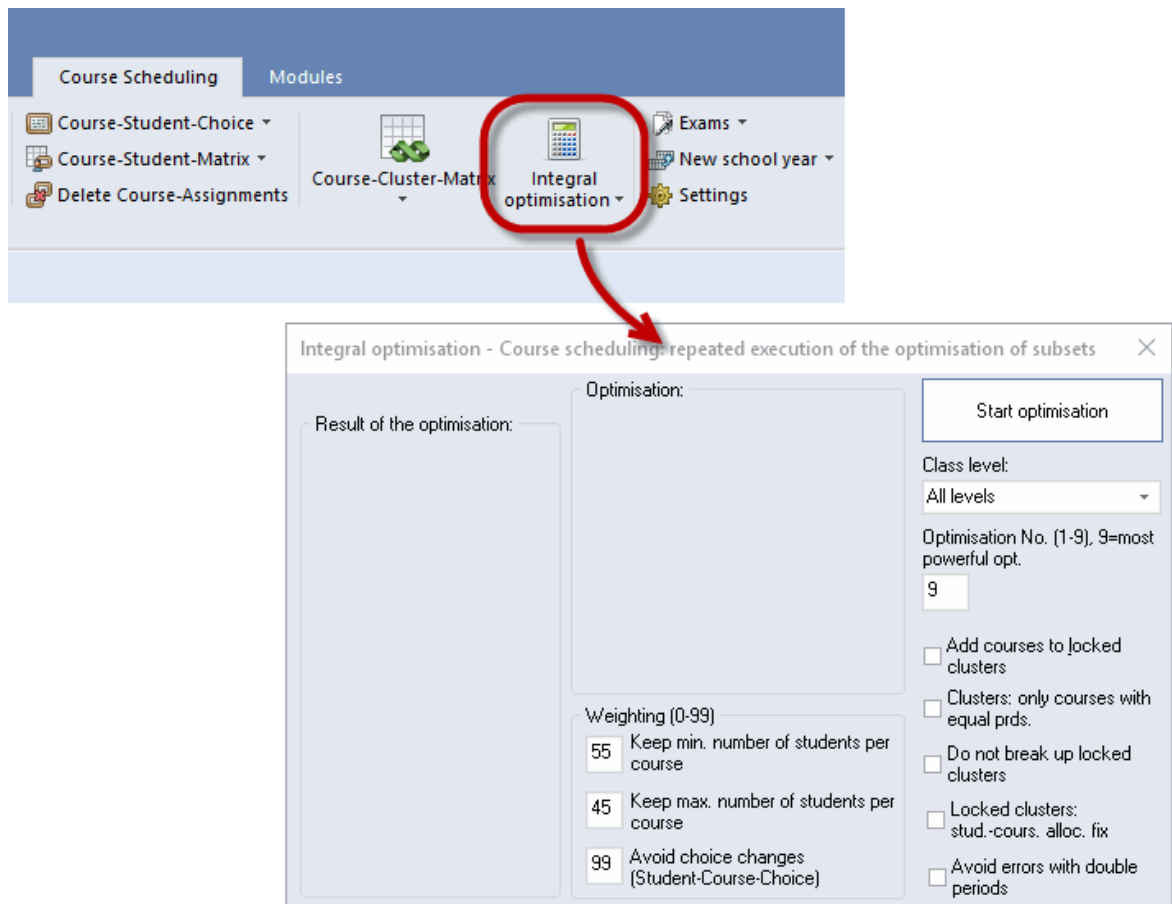
No courses from a certain group may be scheduled with courses from another group.

Cluster conditions 2 and 3 in the above example: The three German courses d1, d2 and d3 may not be in the same cluster, i.e. scheduled simultaneously, as English courses e1 and e2.

## 3.3.2 Integral optimisation

Integral optimisation schedules all courses in clusters, and at the same time assigns students to different alternative courses. Practical use shows that [Partial optimisation](#) often is difficult and cumbersome for the user, since selecting the ideal subsets needs a lot of experience and intuition. This is why an algorithm for integral optimization has been developed which takes over exactly this task. It selects subsets according to different parameters and starts partial optimisation.

You can start integral optimisation on the 'Course scheduling' tab by clicking on Integral optimisation.



In the optimisation dialogue you can select additional options such as weighting, etc. (see



Partial optimisation can be divided into three processes:

1. [Specifying subsets](#)
2. [Defining optimisation parameters](#)
3. [Optimising subsets](#)

### 3.3.3.1 Specifying subsets

The selection of courses that are to be scheduled simultaneously in partial optimisation is extremely important for the subsequent optimisation run. This is where you must use your experience and knowledge of your school to good effect in order to achieve a good result.

#### Course list

The course list displays all the courses of the currently active class level (year) that can be selected for partial optimisation. These are all the courses that still have open periods, i.e. periods that have not yet been scheduled in a cluster.

Sub.	Sel.	Per	Level	Stud.	Tea.	Les.
g1	<input checked="" type="checkbox"/>	2 (4)	12	18	Goethe	14
g2	<input checked="" type="checkbox"/>	2 (4)	12	25	Bach	15
g3	<input checked="" type="checkbox"/>	2 (4)	12	12	Ander	115
g1	<input type="checkbox"/>	2 (4)	13	26	Gri	95
g2	<input type="checkbox"/>	2 (4)	13	22	Sutt	96
g3	<input type="checkbox"/>	2 (4)	13	9	Grill	97
E1	<input type="checkbox"/>	5 (5)	13	24	Stan	87
M1	<input type="checkbox"/>	5 (5)	13	13	Kep	90
h1	<input checked="" type="checkbox"/>	2 (2)	13	25	Hero	101
eth1	<input checked="" type="checkbox"/>	2 (2)	13	24	Sen	106
re11	<input checked="" type="checkbox"/>	2 (2)	12	25	Beck	23
ar2	<input checked="" type="checkbox"/>	2 (2)	12	22	Mich	86
bio2	<input type="checkbox"/>	3 (3)	12	19	Foss	73
ch1	<input type="checkbox"/>	3 (3)	12	25	Mend	74
ru1	<input checked="" type="checkbox"/>	3 (3)	12	5	Pas	116
e1	<input checked="" type="checkbox"/>	3 (3)	13	19	Buck	98
m2	<input checked="" type="checkbox"/>	3 (3)	13	18	Gauss	108
m1	<input type="checkbox"/>	3 (3)	12	21	Eul	70

The "Per" column indicates the periods/week of the course and, in parentheses, the periods/week that have not yet been scheduled. The "Stud." indicates how many students have already been assigned to the course. The 'Level' column contains the class levels (years) for which each course is offered.

You can select courses for partial optimisation by checking the box in 'Sel.' column.

#### Note: No restriction

There is currently no restriction on the number of courses in partial optimisation. However, if a subset is selected that is too large, optimisation can take a very long time. You must also take care that your optimisation parameters do not contradict each other when selecting courses.

If, for example, a student has four course choices in a subset, but you wish to form a maximum of three clusters, it will as a matter of principle not be possible to achieve a result. In this case the error



message 'Student has too many courses in subset' will be displayed. In order to avoid such discrepancies, helpful information is shown in the upper part of the window 'Specifying subsets'.

	Courses	Weekly periods (*) Min. required	Clusters (*) Min. required	Average occupancy of the clusters	Selected Num	Per
Scheduled	0	0	0	0	8	5
Selected	8	10*	2*	100 % (57/57)		
Available	21	18*	7*	89 % (51/57)		

Sub.	Set	Per	Level	Stu.	Tea.	Les.
g1	<input checked="" type="checkbox"/>	2 (4)	13	18	Goethe	14
g2	<input checked="" type="checkbox"/>	2 (4)	13	25	Bach	15
g3	<input checked="" type="checkbox"/>	2 (4)	13	12	Ander	115
g1	<input checked="" type="checkbox"/>	2 (4)	13	26	Gri	95
g2	<input checked="" type="checkbox"/>	2 (4)	13	22	Sutt	96
g3	<input checked="" type="checkbox"/>	2 (4)	13	9	Grill	97
E1	<input checked="" type="checkbox"/>	5 (5)	13	19	Shak	6
M1	<input checked="" type="checkbox"/>	5 (5)	13	15	Fer	9
E1	<input checked="" type="checkbox"/>	5 (5)	13	24	Stan	87
M1	<input checked="" type="checkbox"/>	5 (5)	13	13	Kep	90
L1	<input checked="" type="checkbox"/>	5 (5)	13	9	Cic	7
CH1	<input checked="" type="checkbox"/>	5 (5)	13	9	Curie	11
PH1	<input checked="" type="checkbox"/>	5 (5)	13	9	Gal	12
E2	<input checked="" type="checkbox"/>	5 (5)	13	6	Shak	85
L1	<input checked="" type="checkbox"/>	5 (5)	13	11	Sen	88
CH1	<input checked="" type="checkbox"/>	5 (5)	13	16	Nobel	92
bio2	<input checked="" type="checkbox"/>	3 (3)	13	19	Foss	73
ch1	<input checked="" type="checkbox"/>	3 (3)	13	25	Mend	74

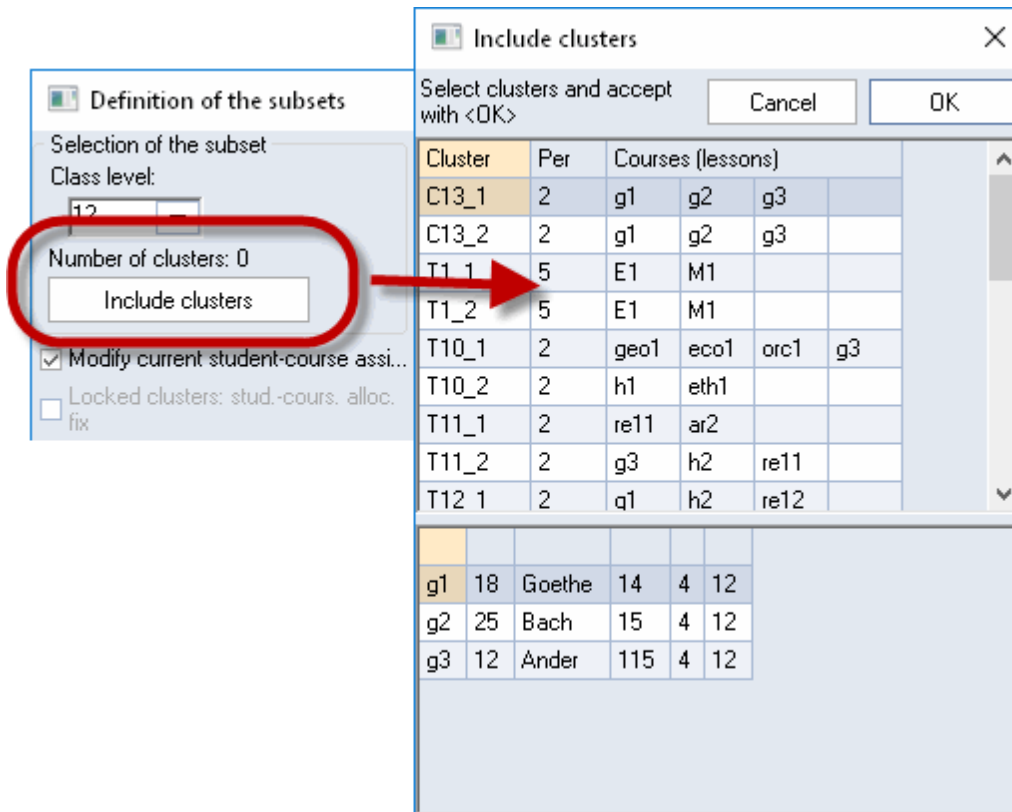
In the example above the 5-period courses of class level 13 are selected, all in all 8 courses (first column, second row). These 8 courses will at least need 10 cluster periods (second column, second row). This shows that at least one student has chosen 2 courses of this selection. You can see this, because Untis notes that at least 2 clusters are necessary (third column, second row). If the selected courses can be scheduled in 2 clusters, then all clusters will be scheduled with students of class level 13. The fourth column, second row shows that 100% are scheduled (57 out of 57 students)

21 courses are still unscheduled (first column, third row).

**Selection of alternative coursesn**  
 All courses which can be selected as alternative courses also need to be included in partial optimisation. If student Oban, e.g. has the courses d1, d2 and d3 as alternative courses in his selection, these three courses can only be selected together.

### Include clusters

Existing clusters are usually ignored in partial optimisation. However, it is possible to include existing clusters as the starting point for creating new clusters.



Clicking the button <Include clusters> displays a dialogue with list of available clusters. Here you can select the desired clusters and then include them in partial optimisation by clicking on <OK>.

### 3.3.3.2 Optimisation parameters

In addition to [selecting courses](#) , you have the following options for defining optimisation parameters.

Definition of the subsets
✕

Selection of the subset

Class level:  
 ▼

Number of clusters: 7

Include clusters

Modify current student-course assi...

Locked clusters: stud.-course.alloc.fix

Optimisation No. (1-9), 9=most powerful opt.

Number of clusters to be created

Max. number of courses per cluster

Max. No. of choice changes (Stud.-Co-Ch)

Weighting (0-99)

Keep min. number of students per course

Keep max. number of students per course

Avoid choice changes (Student-Course-Choice)

		Courses			Weekly periods (*) Min. required					
		Scheduled	Selected	Available	64	18	0	76	10*	0*
Sub.	Sel.	Per	Level	Stud.	Tea.	Les.				
g1	<input checked="" type="checkbox"/>	2 (4)	12	18	Goethe	14				
g2	<input checked="" type="checkbox"/>	2 (4)	12	25	Bach	15				
g3	<input checked="" type="checkbox"/>	2 (4)	12	12	Ander	115				
n1	<input checked="" type="checkbox"/>	3 (3)	12	21	Eul	70				
ch2	<input checked="" type="checkbox"/>	3 (3)	12	16	Mend	80				
e2	<input checked="" type="checkbox"/>	3 (3)	12	12	Buck	82				
bio1	<input checked="" type="checkbox"/>	3 (3)	13	24	Foss	109				
ch1	<input checked="" type="checkbox"/>	3 (3)	13	7	Curie	110				
e1	<input checked="" type="checkbox"/>	3 (3)	12	12	Car	16				
n2	<input checked="" type="checkbox"/>	3 (3)	12	19	Colu	71				
bio1	<input checked="" type="checkbox"/>	3 (3)	12	20	Foss	72				
n1	<input checked="" type="checkbox"/>	3 (3)	13	25	Pas	107				
ph1	<input checked="" type="checkbox"/>	3 (3)	13	13	Meit	111				
beb1	<input checked="" type="checkbox"/>	2 (2)	12	31	Ander	76				
peg1	<input checked="" type="checkbox"/>	2 (2)	12	24	Bach	78				
geo1	<input checked="" type="checkbox"/>	2 (2)	13	12	Stan	102				
eco1	<input checked="" type="checkbox"/>	2 (2)	13	9	Smith	103				
re12	<input checked="" type="checkbox"/>	2 (2)	13	9	Grill	105				

**Modify current student-course assi...**

Checking this box means that any existing [student course choices](#) will be disregarded during the optimization.

**Locked clusters: stud.-course.alloc.fix**

Checking this box means that the current allocation of the students will not be changed with locked clusters.

**Optimisation no.**

The optimisation number determines the depth of the search for solutions. The larger the number, the more combinations Untis will search in order to find a solution. Valid entries are 1 to 9. No combinations will be skipped if you select 9.

**Number of clusters to be created**

Use this field to specify the maximum number of [clusters](#) that are to be formed. Optimisation will then look for a solution where all courses in the [subset](#) are scheduled in these clusters.

**Note: Minimum number of clusters**

You need at least as many clusters as the maximum number of course choices of each student if you wish to avoid student clashes. If, for example, a student has defined 12 different course choices, you will need at least 12 clusters.

**Max. number of courses per cluster**

You can use this parameter to limit the number of courses that are to be scheduled in one cluster.

**Max. number of choice changes (Stud.-Co-Ch)**

It is usually the goal to find solutions where no student takes two courses in the same cluster since such a solution forces the student to choose other courses, i.e. to change his/her course choice.

However, if it is not possible to find a solution without student clashes, you can also search for solutions that cause students to change their course choices. Enter the maximum number of student course choice changes allowed.

**Weighting parameters**

Weighting parameters are used to define to what degree some of the conditions should be taken into account during optimisation. In addition to a weighting value for observing the minimum and maximum number of students per course, there is also a weighting value for the importance of avoiding student clashes.

Once you are satisfied with the course choices, click on <Continue> in order to start actual [optimisation](#) .

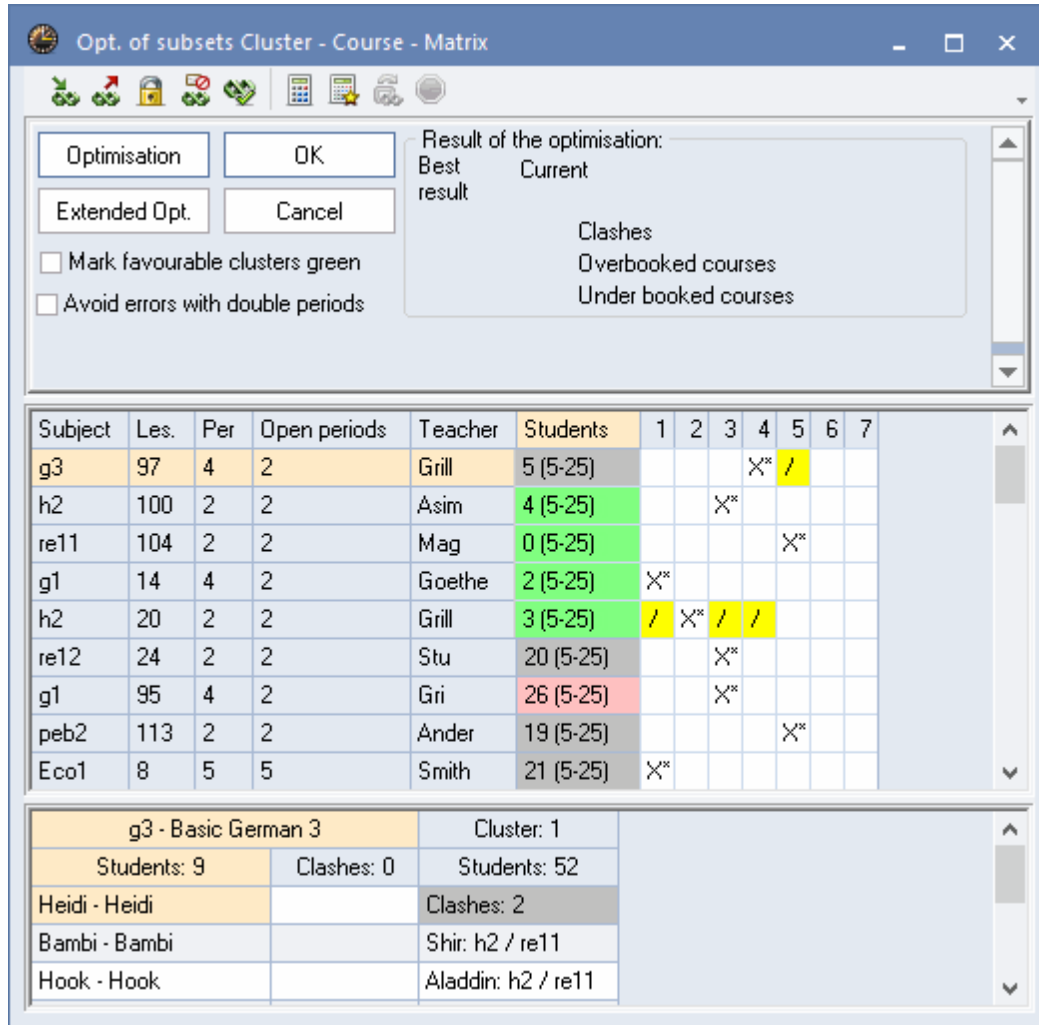
**Note: Plausibility check**

The entries are now tested for their plausibility and a corresponding message will be displayed if problems are encountered. Some of these messages allow you to decide whether you wish to continue with these entries or whether you wish to alter the parameters.

**3.3.3.3 Partial optimisation**

If no entries are likely to hinder optimisation, the corresponding subset optimisation window will open make [make or prohibit course-cluster assignments](#) and where you can start the actual optimisation run.

In the right section of the top window area - the status display - data about the solutions that have been found is displayed during and after optimisation. After optimisation the <OK> button serves to save the result of optimisation or any manual entries. Clicking the <Cancel> button discards the results found so far and takes you back to the 'Definition of the subsets' dialogue.



The middle part of the window contains a simplified cluster-course-matrix with the courses of the subset and the clusters to be filled by partial optimisation. The 'Students' column displays the number of students attending the relevant course as well as the minimum and maximum number of students entered for this course (in parentheses). Red indicates that the maximum number of students has been exceeded and green that the minimum number has not been reached.

The students of the selected course are listed individually and details about possible clashes are given in the bottom section of the window. You can see the number of students as well as details about eventual clashes for the selected cluster.

If you have added clusters to the subset, the courses of the clusters which already have been entered are in the middle section (marked with an 'X') and are also locked. This ensures that existing cluster definitions are retained.

You can also manually assign courses to certain clusters and lock clusters for certain courses. In addition, you are provided with information on how well the selected would fit in with a particular cluster.

In this window you manually an allocate courses to certain clusters or you can block cluster for certain courses. Additionally you are informed how well a selected course fits into the cluster. Please refer to ' [Toolbar functions](#) ' below.

How long optimisation takes mostly depends on the following factors:

- Number of [courses](#) and [clusters](#)
- The structure of students' [course choices](#)
- Locked and blocked courses/clusters (increases the length of time considerably)
- [Optimisation type](#) (fast or extended)
- [Optimisation no.](#)

You can start with simple optimisation for the initial optimisation run. If no solution is found, try extended optimisation.

**Note: Blocked, locked courses/clusters**

If you lock clusters or exclude courses from certain clusters, different clusters and courses are no longer equal and therefore the number of combinations which has to be examined can be drastically increased (a hundredfold or even more).

You can examine the best solutions after optimisation. Select the solution you are interested in from the list-box. The number of clashes as well as the number of overbooked and underbooked courses are indicated in parentheses next to number of the solution.

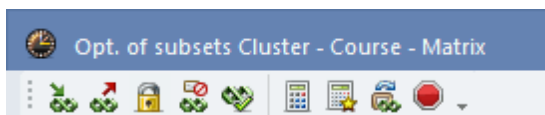
**Note: Unrealistic numbers**

If the minimum and maximum numbers of students for a course are not realistic (based on their course choices), Untis calculates the optimum number of students for the course in question, and the number of over- or booked courses is determined on the basis of this number. This can result in differences to the display in the course-cluster-matrix.

If, for example, a course can be taken by at least 5 and at most 25 students (according to the entry in the course-students-overview), but only 3 students have chosen this course as an alternative, then these 3 students are the most that can be assigned to the course after optimisation. This course would then be marked as underbooked in the course-cluster-matrix whereas it would not be counted as underbooked in the solution display.

### 3.3.3.3.1 Toolbar functions

You can control optimisation with the following toolbar functions:



#### Add course to the cluster

This function allows you to add a course to a cluster. To do this, select the course and the desired cluster and click on the 'Add course to the cluster' button. You can alternatively add a course to a cluster with a simple double-click.

**Note: Locking a course**

You have to lock this course if this course-cluster-assignment is to be observed during a subsequent optimisation run.

## Remove course from the cluster

If you wish to remove a course from a cluster, select the course and the desired cluster and click on the 'Remove course from the cluster' button. You can alternatively remove a course from a cluster with a simple double-click.

## Fix course in cluster

If you wish a particular course to be scheduled in a certain cluster in all cases, add this course to the desired then lock it by using the 'Fix course in cluster' button. A locked course is marked with a \*.

## Exclude course from cluster

If you wish to avoid a course being scheduled in a certain cluster, select course and cluster and click on the 'Exclude course from cluster' button. Optimisation will not now place this course in the cluster marked with the block.

The block is represented in the cell with a forward slash '/'.

## Favourable clusters green

This function highlights all those clusters to which each course could be added in green. Restrictions such as [cluster conditions](#) are taken into consideration during the check.

Alternatively, you can also check the box 'Mark favourable clusters green'. This will highlight the favourable clusters for the selected course when you click in the corresponding row.

## Optimisation / Extended Opt.

You can choose between one of the two variants for optimisation. In principle both variants are based on the same algorithm. The first one is faster because some combinations are considered to be equal and are therefore not re-examined.

In contrast to fast optimisation, extended optimisation also takes into account that

- Two parallel courses can be scheduled in the same cluster
- Parallel courses are considered equal if teachers are already assigned to them.

## Skip combinations

Optimisation will automatically skip combinations if a solution has not been found after a specific time. This function enables you to skip functions manually in order to speed up optimisation.

## Cancel optimisation

Clicking this button terminates the optimisation run. Solutions found so far are saved.

### 3.3.3.3.2 Partial optimisation example

We now wish to demonstrate the practical application of partial optimisation.

First remove all existing [course assignments](#) , delete all existing [clusters](#) and then launch [partial optimisation](#) .

Since there are no clusters, all course weekly periods are still to be scheduled, and the course list therefore contains all the courses of our school.

In the first step we are going to schedule all the courses with 5 periods/week. Start by sorting the [course list](#) according to the number of periods by clicking on the "Per" column heading. Then hold the left mouse-button move the cursor across all the 5-period courses. Now press <SPACE> or click in the 'Sel.' column to mark the courses.

Definition of the subsets

Selection of the subset  
Class level:

Number of clusters: 21

Modify current student-course assi...  
 Locked clusters: stud.-cours. alloc. fix

9 Optimisation No. (1-9), 9=most powerful  
**3** Number of clusters to be created  
99 Max. number of courses per cluster  
0 Max. No. of choice changes (Stud.-Co-Ch)

Weighting (0-99)  
55 Keep min. number of students per course  
45 Keep max. number of students per course  
99 Avoid choice changes (Student-Course-Choice)

Courses		Weekly periods (*) Min. required	Clusters (*) Min. required	Average occupancy of the clusters	Selected Num	Per
Scheduled	64	76	26	38 % (43/112)	13	5
Selected	56	29*	10*	83 % (93/112)	15	3
Available	0	0*	0*	0	28	2

Sub.	Sel.	Per	Level	Stud.	Tea.	Les.
Eco1	<input checked="" type="checkbox"/>	5 (5)	12	21	Smith	8
BIO1	<input checked="" type="checkbox"/>	5 (5)	12	10	Nobel	10
H1	<input checked="" type="checkbox"/>	5 (5)	12	12	Cer	13
Eco1	<input checked="" type="checkbox"/>	5 (5)	13	22	Marx	89
BIO1	<input checked="" type="checkbox"/>	5 (5)	13	10	Mend	91
PH1	<input checked="" type="checkbox"/>	5 (5)	13	11	New	93
H1	<input checked="" type="checkbox"/>	5 (5)	13	7	Tolk	94
L1	<input checked="" type="checkbox"/>	5 (5)	12	9	Cic	7
CH1	<input checked="" type="checkbox"/>	5 (5)	12	9	Curie	11
PH1	<input checked="" type="checkbox"/>	5 (5)	12	9	Gal	12
E2	<input checked="" type="checkbox"/>	5 (5)	12	6	Shak	85
L1	<input checked="" type="checkbox"/>	5 (5)	13	11	Sen	88
CH1	<input checked="" type="checkbox"/>	5 (5)	13	16	Nobel	92
bio2	<input checked="" type="checkbox"/>	3 (3)	12	19	Foss	73
ch1	<input checked="" type="checkbox"/>	3 (3)	12	25	Mend	74
ru1	<input checked="" type="checkbox"/>	3 (3)	12	5	Pas	116
e1	<input checked="" type="checkbox"/>	3 (3)	13	19	Buck	98
m2	<input checked="" type="checkbox"/>	3 (3)	13	18	Gauss	108

We will first try to manage with three clusters, and so we enter a '3' in the field 'Number of clusters to be created'.

Click on the <Continue> button to proceed to the next step. No problems are encountered and no warnings are displayed, and so the ' [Opt. of subsets](#) ' window is displayed. We do not wish to set any constraints/parameters so we can launch optimisation immediately by pressing the < [Optimisation](#) > .

Untis finds a solution without clashes almost immediately and displays the message 'Optimisation completed - Solution found'. Confirm this with<<>OK>. You can see how courses have been scheduled in clusters in the [course-cluster-matrix](#) .



The screenshot shows a software window titled "Opt. of subsets Cluster - Course - Matrix". It contains a table of subjects and their attributes, a "Result of the optimisation" section, and a "Hint" dialog box.

**Result of the optimisation:**

Best result	Current
Clashes	
Overbooked courses	
Under booked courses	

**Table of Subjects:**

Subject	Les.	Per	Open periods	Teacher	Students	1	2	3
h1	101	2	2	Hero	25 (5-25)	X*		
eth1	106	2	2	Sen	24 (5-25)	X*		
re11	23	2	2	Beck	24 (5-25)		X*	
ar2	86	2	2	Mich	23 (5-25)		X*	
g3	97	4	2	Grill	9 (5-25)			X*
h2	100	2	2	Asim	25 (5-25)			X*
re11	104	2	2	Mag	15 (5-25)			X*
g1	14	4	2	Goethe	18 (5-25)			
h2	20	2	2	Grill	21 (5-25)			
re12	24	2	2	Stu	16 (5-25)			
g1	95	4	2	Gri	26 (5-25)			
peb2	113	2	2	Ander	19 (5-25)			
Eco1	8	5	5	Smith	21 (5-25)			
BI01	10	5	5	Nobel	10 (5-25)			
H1	13	5	5	Cer	12 (5-25)			
Eco1	89	5	5	Marx	22 (5-25)			
BI01	91	5	5	Mend	10 (5-25)			

**Cluster Summary:**

h1 - Basic Histroy 1		Cluster: 1
Students: 25	Clashes: 0	Students: 49
Heidi - Heidi		Clashes: 0
Susie - Susie		
Shir - Shir		

**Hint Dialog:**

Optimisation completed - Solution found

OK

Now press <OK> in the "Opt. of subsets" window and confirm the save cluster prompt with <YES>. The 'Definition of the subsets' window will be redisplayed.

In the next step, we are going to schedule all courses with 3 periods/week and see whether we will be able to manage with just 2 clusters. Mark all the 3-period courses, enter 2 in the "Number of clusters to be created" field and then press <Continue>. A message is displayed informing us that student *Talisker* has too many courses in our selected subset, i.e. 3, but we only allow the creation of 2 clusters. We could now press <Cancel> and change our input, but we would first like to know whether there are any other students with too many courses before we decide on a new number of clusters. The next message window lists a whole number of students with too many courses. We now press <Cancel> and enter 3 as the desired number of clusters to be created. Clicking on <Continue> and confirming the message with <OK> takes us to the optimisation dialogue.

The screenshot shows the 'Definition of the subsets' dialog box with the following summary table:

	Scheduled	Courses	Weekly periods (*) Min. required	Clusters (*) Min. required	Average occupancy of the clusters	Selected Num	Per
		17	15	3	66 % (75/112)	15	3
Selected		15	9*	3*	75 % (85/112)		
Available		32	14*	6*	84 % (95/112)		

The 'Data analysis' window shows the following errors:

No.	Text
1	Student has too many courses in this subset Students: Talisker - Talisker No. of courses: 3
2	Student has too many courses in this subset Students: Laphroaig - Laphroaig No. of courses: 3
3	Student has too many courses in this subset Students: Scapa - Scapa No. of courses: 3

Start optimisation again, and almost instantly there is a solution Click on <OK> to once more save the clusters.

In the next step we are going to schedule the 4-period clusters together with the 2-period clusters. Please mark all the relevant courses with and test if 4 clusters are sufficient. After clicking on <Continue> we see the message that one student has 6 courses in the subset. We therefore increase the number of clusters to 6 and reach the optimisation dialogue without any further messages.

After optimisation is launched, a solution is quickly found but Untis is not completely satisfied with it and continues the calculation. After a certain time a solution is found that does not violate any boundary conditions, and the message 'Optimisation completed, solution found' is displayed. We save the clusters once more and now see that only the two remaining weekly periods of the German courses have not been scheduled.

We could now have partial optimisation schedule the remaining German lessons in a new cluster. The result is then shown in the course-cluster matrix.

Course-Cluster-Matrix

Only avail. periods: 38 Periods/week 0 Clashes

Class level: Subject/Les. Per (Open periods) Students  
 BI01 / 10 5 (0) 10

Class: Cluster  
 T2 5 93

								*1	*2	*3	*4	*5	*6	*7	*8	*9	*10	*11	*12	*13
								T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13
								5	5	5	3	3	3	2	2	2	2	2	2	2
								65	93	66	84	84	87	112	98	97	73	94	97	112
Subje	Les.	Per	Open	Teach	Class	Level	Stu.	65	93	66	84	84	87	112	98	97	73	94	97	112
BI01	10	5	0	Nobel	12	12	10	X												
BI01	91	5	0	Mend	13	13	10	X												
bio1	72	3	0	Foss	12	12	20						X							
bio1	109	3	0	Foss	13	13	24					X								
bio2	73	3	0	Foss	12	12	19				X									
CH1	11	5	0	Curie	12	12	9			X										
CH1	92	5	0	Nobel	13	13	16			X										
ch1	74	3	0	Mend	12	12	21					X								
ch1	110	3	0	Curie	13	13	7					X								
ch2	80	3	0	Mend	12	12	20				X									
g1	14	4	0	Goeth	12	12	17												X	X
g1	95	4	0	Gri	13	13	23												X	X
g2	15	4	0	Bach	12	12	25									X				X
g2	96	4	0	Sutt	13	13	11						X							X
g3	97	4	0	Grill	13	13	23												X	X
g3	115	4	0	Ander	12	12	13										X			X
E1	6	5	0	Shak	12	12	13	X												
E1	87	5	0	Stan	13	13	24	X												

Subject Les. Type Name Stat code(s)

As an alternative to partial optimisation you can also try [Integrated optimisation](#) which performs every single step automatically.

### 3.3.4 Optimisation for several class levels

Optimisation for several class levels (years) If you have to schedule courses for several class levels (years), you can either run optimisation for all the levels at once or you can optimise one level at a time. Which procedure delivers the better results depends on the structure of your course choices.

If you have only a few or no cross-level courses, it will be better to optimise every class level separately. Otherwise it is advisable to schedule all course together in one go.

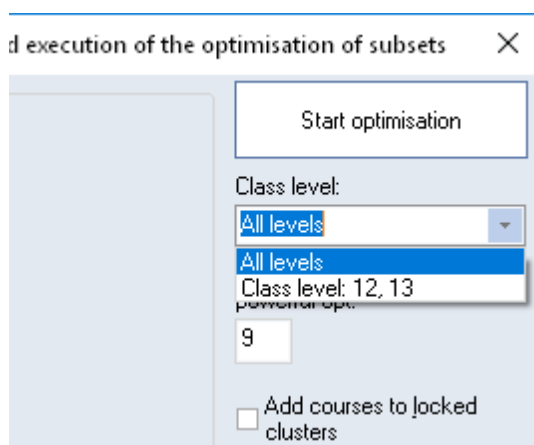
#### Split cluster by year/level



If it is found after [course optimisation](#) that there are mainly courses from different class levels in one cluster, it is often advisable for the subsequent timetable optimisation to split the cluster using the function <Split cluster by class level> in the [course-cluster-matrix](#) . This will in many cases allow you to break unnecessary links between lessons which place additional restrictions on timetable optimisation.

## Class levels in integral optimisation

If you wish to schedule courses of different class levels separately, proceed as follows with [integral optimisation](#) :



## Class levels in partial optimisation

Partial optimisation is far more flexible with regard to scheduling courses at different school levels because you can explicitly select the courses that are to be optimised.

Three possibilities are outlined briefly here.

1. First create clusters for cross-level courses. Then add courses of the individual levels to these clusters. To this end, include existing clusters in each optimisation run.
2. As a first step, optimise all courses of the first level and all cross-level courses. Then schedule the next class level, including the clusters that have already been created.
3. You can also proceed in a much more differentiated way. For example, optimise all 5-period courses for all class levels together. The clusters for the other courses can then be created for each class level separately.

### 3.3.5 Term-related optimisation

The multiple terms timetable module allows you to create different timetables for different parts of the year.

This makes it possible to offer your students a completely different range of courses in every semester from and to create separate timetables for each semester.

## Year's planning in terms

An important tool for scheduling and dividing up a school year is the 'Year's planning in terms' option. This enables you to very simply distribute lessons over the individual terms, i.e. as required by our

example, to assign courses either to the first or to the second semester. You will find a detailed description of the window in the manual 'Modules' in chapter 'Year's planning in terms'.

Term planning for the year, when combined with the course scheduling module, attempts to ensure during the optimisation of course assignments that each student has a balanced workload across all terms and that alternative courses are evenly utilised.

Own weighting options take account of course distribution at student level.

#### Note: Fixed course assignments

In order not to lose optimised course assignments after terms have been created the corresponding course choices are automatically locked when the terms are created

The screenshot shows the 'Year's planning in terms' application window. The main table lists courses with columns: Les., Sub., Cla., Tea., Rm., Stude, Total, Min., M Code, UnSc, 1, 2. An 'Optimisation' dialog box is open, showing 'Teachers' selected. It has 'Weighting' options: 'Unimportant' and 'Important' (selected), and 'Evenly distribute weekly periods' (selected) and 'Observe Plan/week'. There are also 'Observe min./max.' options for 'Min. Periods per week' and 'Max. Periods per week', both set to 0. Buttons for 'OK', 'Cancel', 'Apply', and 'Help' are at the bottom.

You have two options after courses have been distributed over terms.

### Termwise optimisation of clusters

Perform standard optimisation before creating terms making sure to check the 'Termwise optimisation of clusters' box in the initial standard optimisation dialogue window. This will prevent courses that do not take place together in any term from being scheduled in the same cluster.

### Optimise terms separately

Use the <Create terms> button to create both terms before creating the clusters, and then optimise each of these terms separately by performing course optimisation in one term and then in the other.

**Note: Course with 0 weekly periods**

Courses are assigned 0 periods/week in terms where they are not planned. This allows you to retain an overview of all student course choices within a term.

These course assignments have already been optimised previously in the 'Year's planning in terms' window. As mentioned above, certain course choices that should not be modified during further processing have now been locked and will therefore not be touched by course optimisation. However, if you wish to change a course assignment in spite of its being locked, you must first remove the lock on the course choice before being able to assign the desired course.. Please always bear in mind that such a change is only performed in the current term, but may have to be taken into account in other terms and may therefore have an effect there, too (e.g. on the total number of weekly periods of the student in that term).

**Note: Copy term**

We strongly advise against making any changes to course choices after terms have been created. If this cannot be avoided, you can use the <Copy to other terms> button in the student-course-choice window to copy the course choice for the current term very easily to any other terms.

### 3.3.6 Course choices/clusters in scheduling

Course scheduling and timetable optimisationAt the end of the course planning process, all student course choices should have been determined there should be a number of clusters with courses that can be scheduled at the same time. It is now important to place the courses and clusters in the timetable, i.e. to schedule them. This task is part of timetable optimisation.

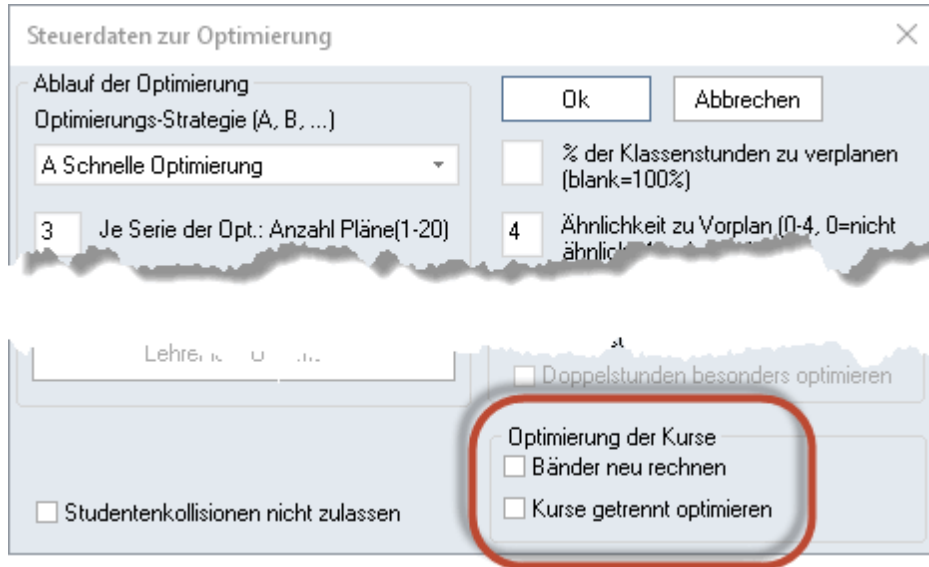
When you select optimisation, there are two options in the optimisation dialogue which are relevant when you use the Course scheduling module:

**Re-calculate clusters**

If you check this box all clusters generated up to this point in time are deleted and a new integral optimisation will be run. Only then timetable optimisation will be started.

**Optim. courses separately**

If you check this box all lessons which are no courses will be ignored. Courses will subsequently be optimized until no improvements can be found anymore. Then the remaining lessons will be optimised and the entire timetable will be completed.



Please ensure that no contradictory entries are made for the courses of a cluster, e.g. one course is to be given in double periods and another one in single periods. This type of input can impair the results of optimisation.

**Note: Cluster conditions**

are one way of preventing such results. To this end, define one cluster condition with the single-period courses and another with double-period courses and specify that course from the one condition may not be scheduled with course from the other condition in the same cluster.

There are basically two different methods for timetable optimisation.

### Clusters may be broken up

If course assignment to clusters may be modified, timetable optimisation can begin immediately. For timetable optimisation, a cluster is nothing other than a group of simultaneous courses. All courses in a simultaneous group are scheduled by placement optimisation at one position in the timetable. However, swap optimisation may still move individual courses.

### Clusters must be retained

If clusters need to be retained at all costs you can convert all or selected clusters to couplings in the course-cluster matrix. This ensures that all course in a cluster really are scheduled at the same positions in the timetable.



**Note: Couplings to simultaneous groups**

You can access the reverse function via 'File | Auxiliary functions | Couple. to Less.-Sequ.'

**Warning: Fixed (locked) clusters**

If you fix clusters, all courses in the clusters concerned will be fixed. This means that these course cannot be moved during swap optimisation. This represents a significant restriction on optimisation.

## 4 Exam scheduling

Exams (tests) are held in the course of the school year. These are one-off events on fixed dates. Specifying an exam date has direct consequences for normal lessons, which should if possible continue without interruption. If students take most lessons together since they are included in fixed classes, lessons taking place at the time of the exam will simply be cancelled since all students in the class will normally have to take the exam.

However, if students have elective courses, the scheduler will need exact information about

- for which courses an exam is being held (exam courses),
- which students are taking part in the exam,
- which courses are taking place in parallel to the exam (here quite naturally only those courses are relevant where at least one student is taking part in the exam) and
- how many students remain from the courses affected by the exam.

This is where exam scheduling comes into play since it supplies this very information to the scheduler. The core of exam scheduling is the '[Exam scheduling](#)' window, which helps you when putting together courses for which an exam can be held, together with the '[Exams](#)' window, which provides you with the relevant information on all exams.

### 4.1 'Exam scheduling' window

The exam scheduling window can be called either from the menu via 'Modules | Course scheduling | Exam scheduling' or via the button of this name in the 'Course scheduling' toolbar.

Period	Total	Exam	Remaining	No. of courses	Exam-courses
Mo-1	58	58	0	3	2
Tu-2	65	65	0	4	0
We-3	86	86	0	5	0
Th-4	93	93	0	7	7
Fr-5	83	83	0	5	0
Sa-6	50	50	0	5	0
Su-7	34	34	0	2	1
-8	67	67	0	4	4
-9	32	32	0	2	0
-10	80	80	0	4	3
Mo-1	15	15	0	1	0
Tu-2	48	48	0	3	0
We-3	76	76	0	5	5
Th-4	85	85	0	5	2
Fr-5	61	61	0	6	2
Sa-6	56	56	0	4	0
Su-7	15	15	0	1	1
-8	102	102	0	6	0
-9	99	99	0	5	4
-10	34	34	0	2	1
Mo-1	57	57	0	5	0
Tu-2	86	86	0	5	0
We-3	112	112	0	6	3
Th-4	83	83	0	5	0
Fr-5	59	59	0	3	0
Sa-6	52	52	0	5	2
Su-7	79	79	0	3	1

The window serves to schedule an exam, i.e. it helps you with the following:



- [Assembling courses](#) for which exams can be held at the same time.
- [Selecting a time and date](#) when the planned exam is to take place.

It provides an overview of the students concerned, the exact number of students and any possible student clashes for all courses involved in the exam.

**Note: Print course-course matrix**

You can output a course-course matrix using the <Print> or <Print preview> button in the main toolbar. This matrix shows the number of students taking two different courses, indicating how many clashes would be generated if an exam were scheduled for these two courses at the same time.

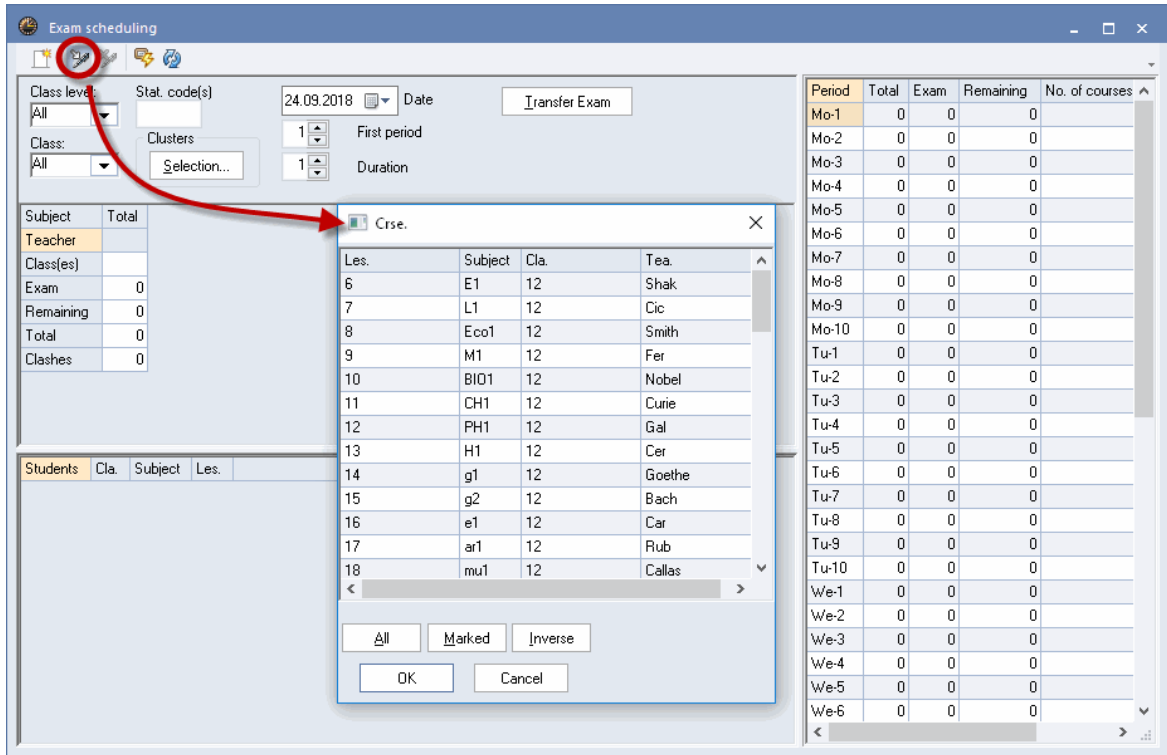
	BIO1	bio1	BIO1	bio1	bio2	CH1	ch1	CH1	ch1	ch2
BIO1	10						5			3
bio1		20				2	15			1
BIO1			10						2	
bio1				24				8		
bio2					19	7				11
CH1		2			7	9				
ch1	5	15					25			
CH1				8				16		
ch1			2						7	
ch2	3	1			11					16
d1	2	9			6	2	8			6
d1			8	10				7	5	
d2	8	9			3	3	15			4
d2			2	8				5	1	
d3				6				4	1	
d3		2			10	4	2			6
E1	2	7			9		7			12

#### 4.1.1 Assembling courses

##### Copying courses

If you wish to add courses to an exam, click on the <Add course to exam> button, select one or more courses and confirm with <OK>. This will copy the selected courses to the exam and you will see the following information in each row:

- Exam: how many students from each of the exam courses will be taking the exam.
- Balance: how many students from each of the exam courses will not be taking the exam.
- Total: how many students take this course in total.
- Clashes: how many student clashes will occur in each of these courses. Details about clashes are displayed in the lower window section.



### Note: Adding individual courses

If you add course to an exam one by one, i.e. if you repeat the process described above, only those courses will be displayed for selection that are not going to cause a student clash with the exam courses already chosen. This makes it very easy to put together courses for which exams can be written simultaneously.

Since clusters should always be free of clashes, there is an alternative way of adding all courses of a cluster to an exam using the <Selection> button (under 'Clusters'). Simply click on the <Add course to exam> button again if you wish to add more course to the exam.

## Removing courses

You can remove courses from the exam by selecting one or more columns with an exam and then clicking on the <Remove course> button.

## New exam

If you wish to clear the window in order to schedule a new exam and delete the previous entries you can use the <Start scheduling> button.

## Not all students

If not all students of courses involved in an exam are to take the exam, you must tell Untis which students (in which course) are to take the exam..

For this purpose you can use the course choice statistical code, which can be entered in the '[Student-course-choice](#)' or '[Course-student-choice](#)' windows. There you should enter a statistical code (e.g. 'w' for written) for all course choices where an exam will take place for the relevant student.

You can now use the 'Stat. code(s)' field in the 'Exam scheduling' window to indicate which students

will be taking part in the exam by entering the appropriate statistical code. This means that only those students will be taken into account for whom the corresponding statistical code is defined in their course choices. You can leave the field empty if all students of the exam courses are to take the exam.

**Warning: Single-letter statistical code**

You can of course define more than one statistical code in a course selection. Please note that the statistical codes may only consist of one letter.

#### 4.1.2 Selecting time/date

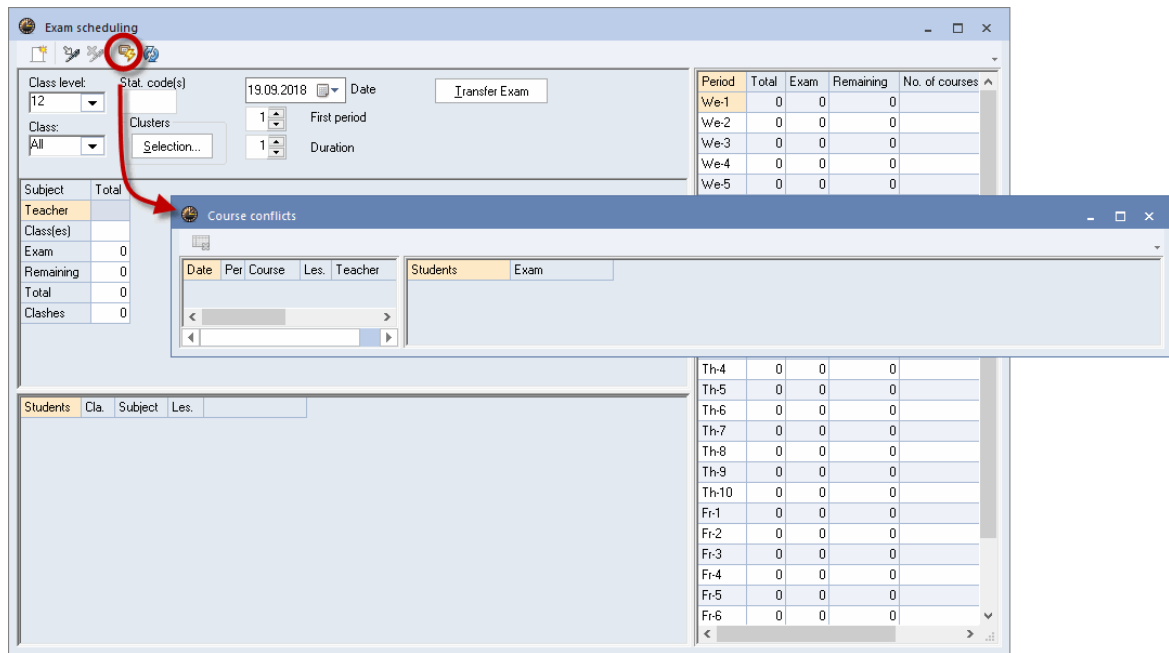
After [course specification](#) a suitable time and date must be found for the exam. To this end, specify a date when the exam should take place the week (in the date field) and enter the duration of the exam in the duration field.

The right window pane will display the data relevant for the exam for each period in the selected week.

- Total: number of students taking a course in this period.
- Exam: number of students taking the scheduled exam and who attend a course in this period.
- Balance: number of students not taking the scheduled exam but who attend a course in this period.
- No. of courses: number of courses taking place in this period.
- Exam courses: number of courses taking place in this period and for which an exam is taking place.

**Note: Only courses involved**

This information only relates to those courses that are also taken by at least one of the students participating in the planned exam. Other courses are, after all, not affected by the exam.



## Conflicting courses

If you wish to see more detailed information on a period, select the desired period and click on the 'Conflicting courses' button to open a window of the same name. This will display which courses and which students are affected by the exam.

### Tip: At least one exam course

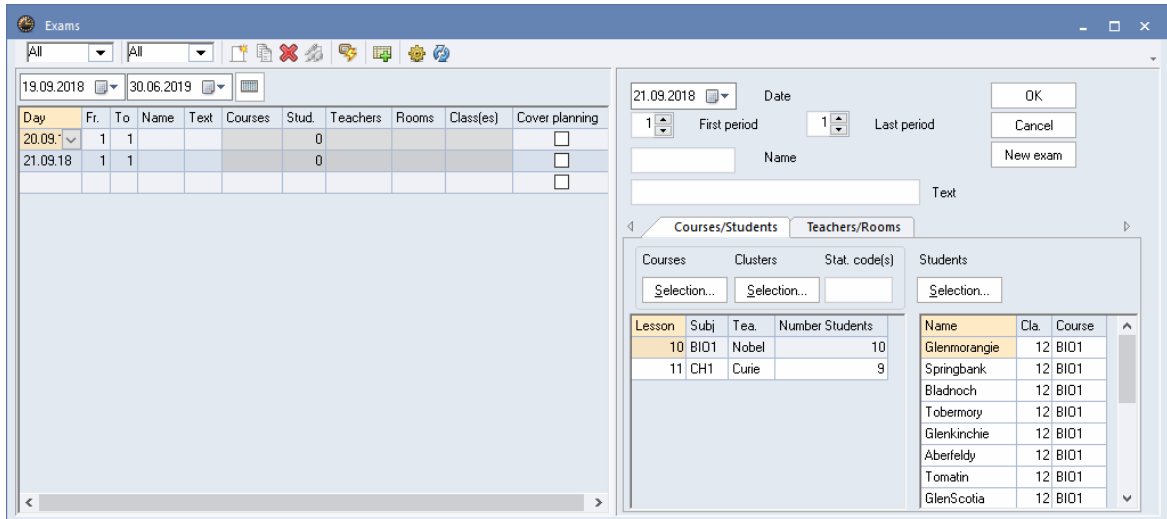
Exams are usually held when affected exam courses (or at least some of them) take place since this involves no timetable changes for the students and they will automatically have the time available. Furthermore, (at least) one teacher and a room are certain to be available for the exam.

Once you have found a suitable time and date you can create the exam with the data displayed using the <Transfer Exam> button and then edit the information in the '[Exams](#)' window.

## 4.2 'Exams' window

The 'Exams' window can be called either from the menu via 'Modules | Course scheduling | Exams' or using the button of this name in the 'Course scheduling' toolbar.

You can specify courses and times/dates for exams via the '[Exam scheduling](#)' window. However, if you already know when an exam is to take place in which course, you can create exams in the 'Exams' window direct.



The 'Exams' window is divided into two parts. The exam list in the left window pane displays the exams that have been defined while the exam dialogue in the right pane serves to display and enter data for the exam selected on the left. A brief description of the individual functions of the exam dialogue follows:

### New exam

In contrast to the majority of all Untis windows you need to click this button before you can enter the details of a new exam. After you have entered all details, click <OK> for saving them.

### Courses/clusters

Just like in the exam scheduling window you can either select individual courses or all courses of a cluster.

### Students

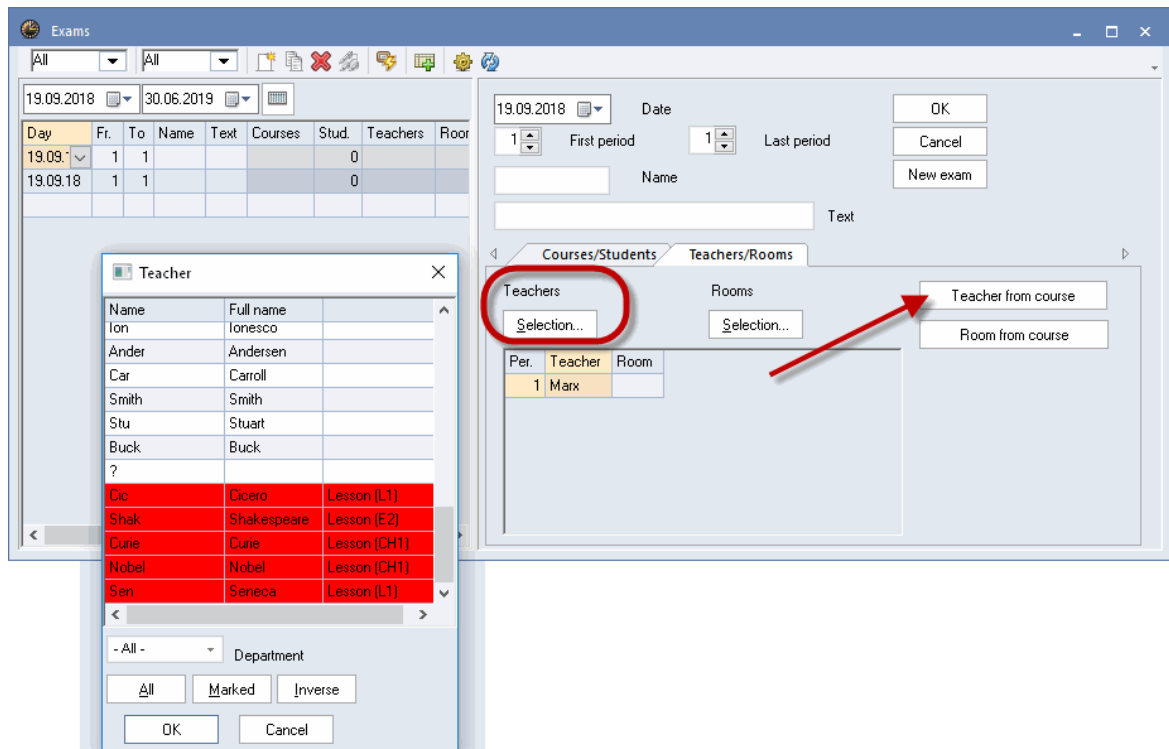
When you specify an exam for a course, all students in the course will be entered for the exam. If you have entered a statistics code in the field *Stat. code(s)*, only those students will be imported which have the respective statistics code in their data. (cf. [Not all students](#).)

You can also add individual students (who perhaps are not in the course) to the exam using the <Selection...> button under 'Students'.

If, on the other hand, there are students who are not to take the exam, you can simply select them and remove them from the exam with <DEL>.

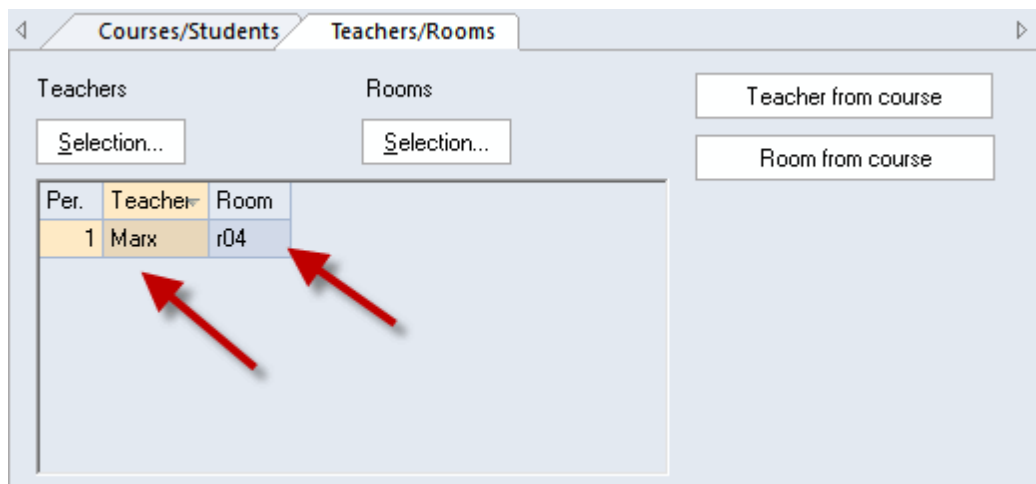
### Teachers/Rooms

In contrast to the '[Exams scheduling](#)' window, you can also assign teachers and rooms to an exam in the 'Exams' window. You can see here whether a teacher teaches in one of the courses assigned to the exam and whether a teacher or room is already booked for a lesson at the time in question.



Input from the selection dialogue also works for several selected rows, meaning that the same teacher or room can be entered in several periods at the same time. By clicking the respective button you can allocate the teacher of the course and the room in which the course usually takes place.

Additionally you can enter several supervision teachers in the fields *Teacher* and *Rooms*.



#### 4.2.1 Functions in exams window

Use the combo boxes for class level and class in the toolbar to restrict the display and input to a particular class level (year) or class. For example, selecting a class results in only those exams being displayed taken by at least one student in the class.

Only courses and students of this class will be listed in the course and student selection dialogues.



### >Display whole school year

The two date fields below the toolbar can be used to restrict the display of exams to a particular range of time. Only those exams will be listed that fall within the specified time range. You can use the <Display whole school year> to switch to a complete list of exams for the entire school year.

### New exam

Click on the button when you wish to enter a new exam. Alternatively, you can simple select the empty row in the exam list.

### Copy exam

Use this function to copy an entire exam (including participating students, teachers and rooms).

### Delete exam

Select the desired exams and then click on this button to delete one or more exams.

### Divide exam

You can use this function to generate  $n$  exams with one course each from an exam with  $n$  different courses. This makes it possible, for example, to transfer all the courses of a cluster to an exam (without clashes), to divide the exam finally to have each exam take place in a different room or in a different period. Use this function if you want to schedule exams in clusters and want to import them to WebUntis.

### Conflicting courses

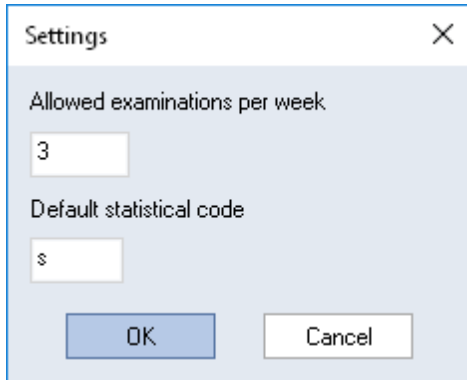
Use this button to open the ' [Course conflicts](#) ' window displaying all courses being held simultaneously with the courses in this exam and taken by at least one of the students participating in the exam.

### Make relevant for cover planning

With this function you import the selected exams into cover scheduling. This function is only available in combination with the Cover scheduling module. Regarding the interaction of Untis with WebUntis you need to be aware that the exam data are always imported with the cover scheduling data. If an exam is not active for cover scheduling it will not be imported to WebUntis and therefore it will not be shown there.

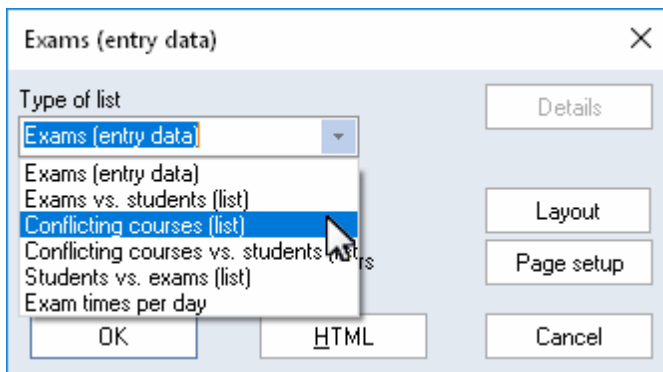
### Settings

The setting function allows you to specify how many exams a student may take in any one week. If this limit is exceeded when you enter an exam, a warning will be displayed and the student will be listed in the right window pane highlighted in purple. Additionally you can enter a Default statistical code for the selection of students for an exam.



## 4.2.2 Printing exams

The 'Exams' window provides a number of lists for you to print or display by selecting the <Print> or <Print preview> buttons from the main toolbar.



### Exams entry data

This list type outputs all exams for the currently active time range in a summary list.

### Exams vs. students list

This list type outputs each exam with all participating students on a separate page.

### Conflicting courses list

Select this list type to generate a list of all courses that clash with the currently selected exam.

### Conflicting courses vs. students list

This list outputs each conflicting course on a separate page listing all students participating in the exam.

### Students vs. exams list

Select this list type to output a summary of each student with his/her exams.

### Exam times per day

Every day is shown with exams, when which exam will take place.

As is usual with Untis, you can also make detail settings for these lists. For example, you can use the 'Print courses with lesson-numbers' check box to specify whether just the course name or also



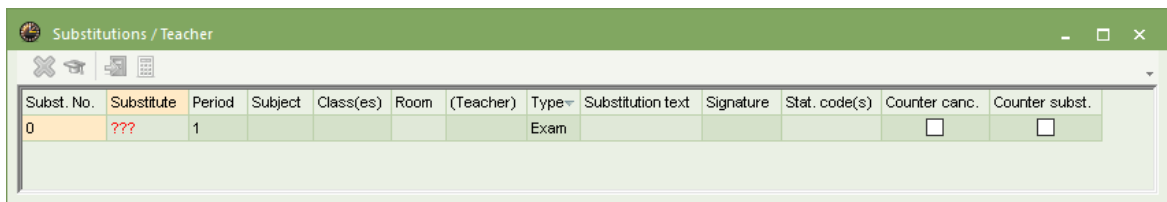
the associated lesson number should be output.

### Report teacher-exam schedule

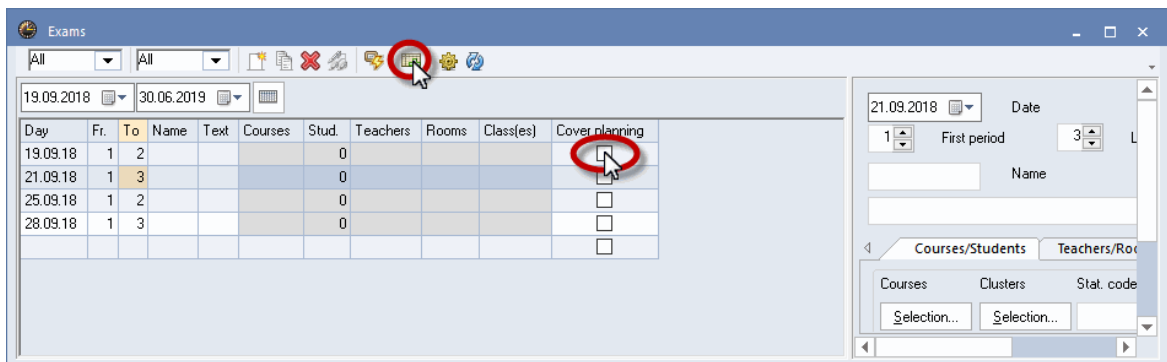
Additionally there is the possibility to print all exams sorted according to teachers via the 'Start' tab - 'Reports'.

## 4.2.3 Exam scheduling and cover planning

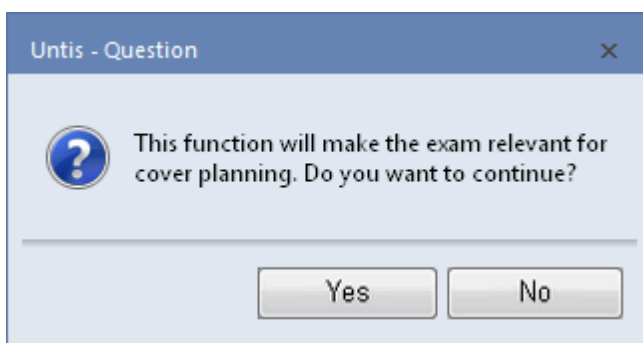
If you have licensed the Cover scheduling module, data from exam scheduling can flow directly into the current timetable. Exams are accepted there as special duties, and courses with few remaining students result in cancellations.



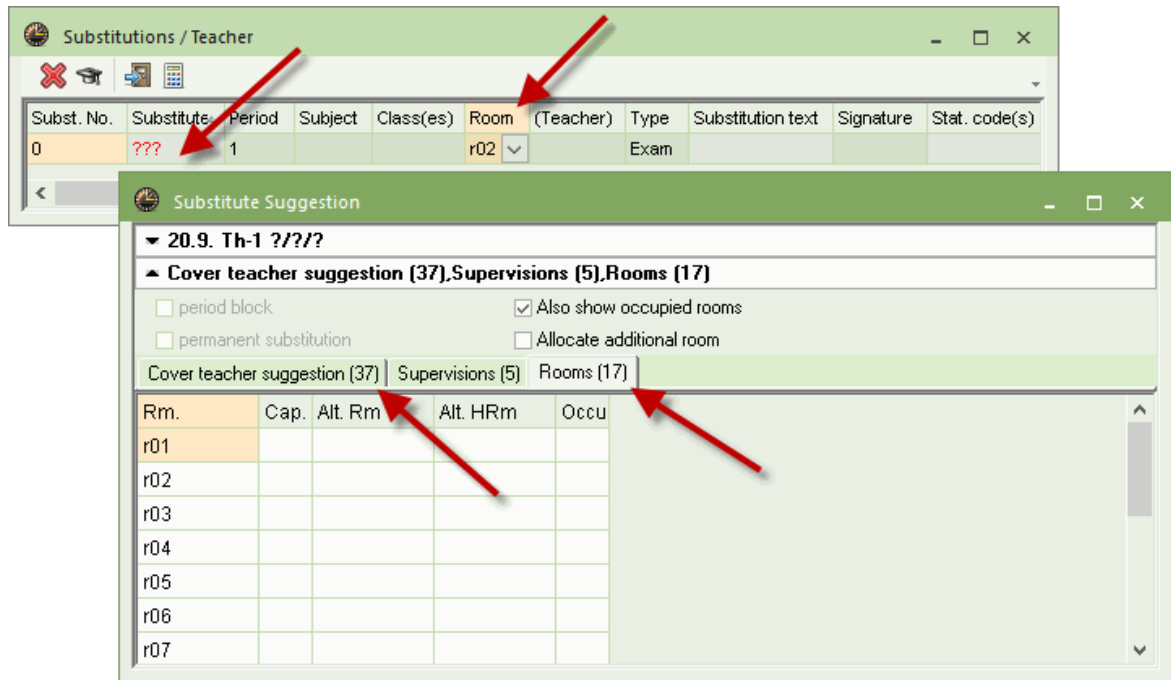
### Make relevant for cover planning



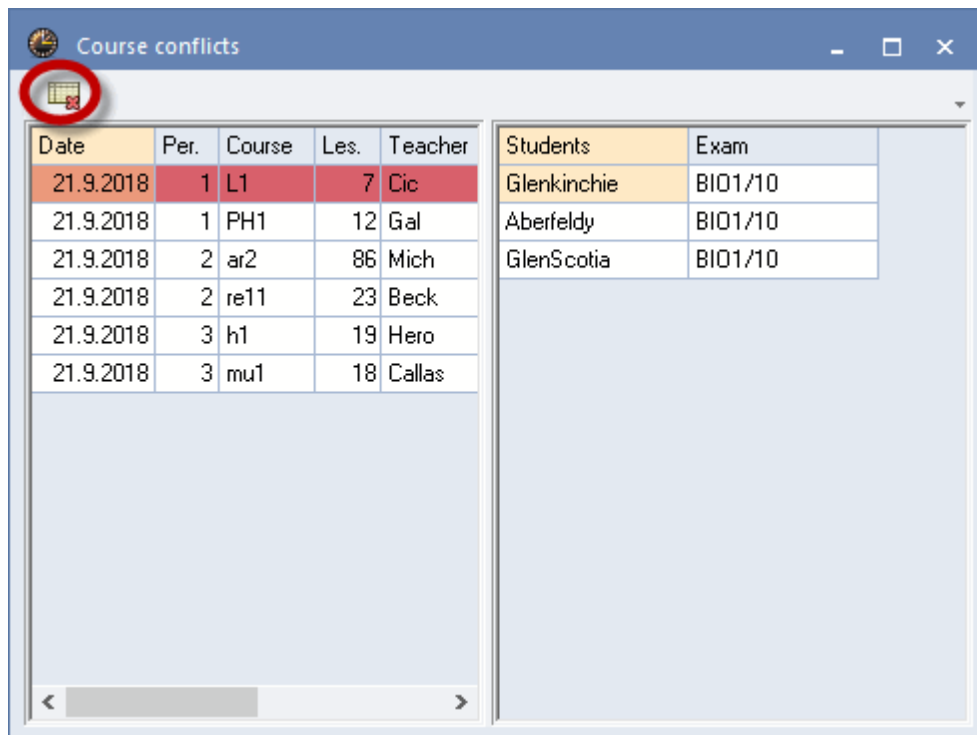
By making exams relevant for cover scheduling, the impact of these exams will be shown in the updated daily timetable. In order to make exams relevant for cover scheduling either click on the respective button or you check the box of the 'Cover planning' column. The exams are shown in the timetables and the cover scheduling lists after confirmation.



You can enter supervision teachers or exam rooms also directly in the cover scheduling lists.



**Generate cancellations**



You can cancel courses with only a few remaining students in the ' [Course conflicts](#) ' window using the <Generate cancellations> button. The course will be cancelled with regard to cover planning and the row will be highlighted red to indicate the cancellation. A cancellation of this type can be reversed

in cover planning.

The exams and the cancellations will be shown in all timetables, also in the student timetables.

Oban - Oban 12 Timetable (Stu-V1)

Oban

01.10.2018 - 5.10.2018

	Mo	Tu	We	Th	Fr
1	E1	M1	CH1	CH1	CH1
2	E1	e1	bio2	peb1	ar2
3	E1		g2		h1
4		g2		bio2	geo1
5		CH1	M1	M1	M1
6	CH1				
7			peb1		g2
8	geo1	h1			e1
9		re12	e1	g2	
10	re12				

L-No.	Tea	Subj.	Rm.	Cla.	Time	Stud.	Special text	Clus
	Shak, E1, r12			12				

Stu-V1 - Students 1\*

12-Year 12 Timetable (Cla1)

01.10.2018 - 5.10.2018

	Mo	Tu	We	Th	Fr
1	re11 ar2	M1	CH1 L1 E2	CH1 E1 PH1	CH1 L1 PH1
2	E4 M4	e1 m2	ch1 bio2 ru1	peb1 peg1	re11 ar2
3	ch4 bio2 ru4	BIO1 Eco H1	g2 g1 g3	BIO1 Eco H1	h1 mu ar1 re2
4	BIO1 Eco H1	eth1 g2 it1	ch2 m1 e2	ch1 bio2 ru1	orc eco ge g3
5	ch2 m1 e2	CH1 E1 PH1	M1 m2	M1 m2	E1 M1
6	PH CH L1 E2	L1 E2	E1 PH1	L1 E2	H1
7	g3		peb1 peg1	g1	eth1 g2 it1
8	eco1 geo orc1	h1 mu ar1 re2	BIO1 Eco H1	m1 ch2	e1 E2
9	bio1	h2 g1 re12	e1 bio1	g2 g3	Eco1 BIO1
10	h2 g1 re12			e2	bio1

L-No.	Tea. Subj. Rm.	Cla.	Time	Stud.	Special text	Cluster	Line text-2
73	(Foss, bio2, (r12))	(12)		19		T4_1 / 3	
+3							

Cla1 - Class 1\*

## 5 Interaction with WebUntis

If your school uses WebUntis, you need to take into consideration the following specialities.

### Student master data

Since only the students of the advanced levels are usually integrated into Untis, WebUntis is the data management system for student master data – at least in the context of the WebUntis <=> Untis system. This is the reason why you can deactivate the import of student data in WebUntis under <Administration> | <Integration> on the 'Untis' tab.

**Integration**

Untis SAML LDAP Office365 Sokrates Smartschool

**Import from Untis**

Import student master data.	<input type="checkbox"/>
Import the studentgroup-assignment	<input checked="" type="checkbox"/>
Do not import student groups with a leading underscore.	<input type="checkbox"/>
Assign all students of a class to a student group with only one class	<input checked="" type="checkbox"/>
Do not import lessons with this statistical code in Untis	<input type="checkbox"/>
Use the teacher colours from Untis	<input type="checkbox"/>
Transfer the teachers' salary data	<input checked="" type="checkbox"/>
Do not transfer open substitutions	<input type="checkbox"/>
Notify all teachers after the import of the lessons.	<input type="checkbox"/>
Mark Untis' "Messages of the day" public	<input type="checkbox"/>
Show Untis' "Messages of the day" :	<input type="checkbox"/> Monitor: Header <input type="checkbox"/> Monitor: Ticker <input checked="" type="checkbox"/> Untis Mobile
Default exam-type for exams.	writing exam ▼
Import the 'Personnel number 2' into the field 'Personnel number'	<input type="checkbox"/>

**Standard types of activity**

Lessons	Lessons ▼
Contact hour	Contact hour ▼
Standby	Standby ▼
Break supervision	Break supervision ▼
Event	Break supervision ▼

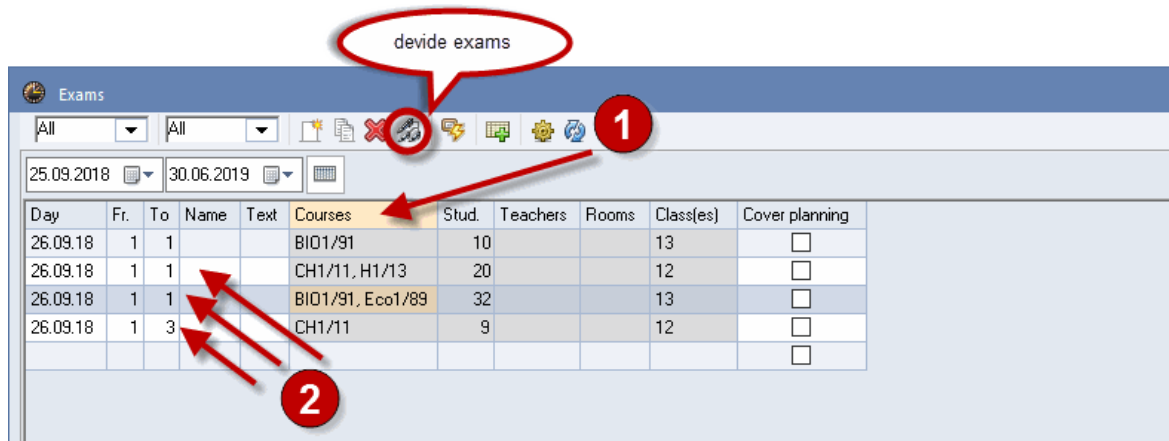
Save

You need to deactivate the student master data flow from Untis to WebUntis especially if the students will be *downgraded* after the new year has started and therefore they attend 2 different classes in the course of a school year.

## Exams

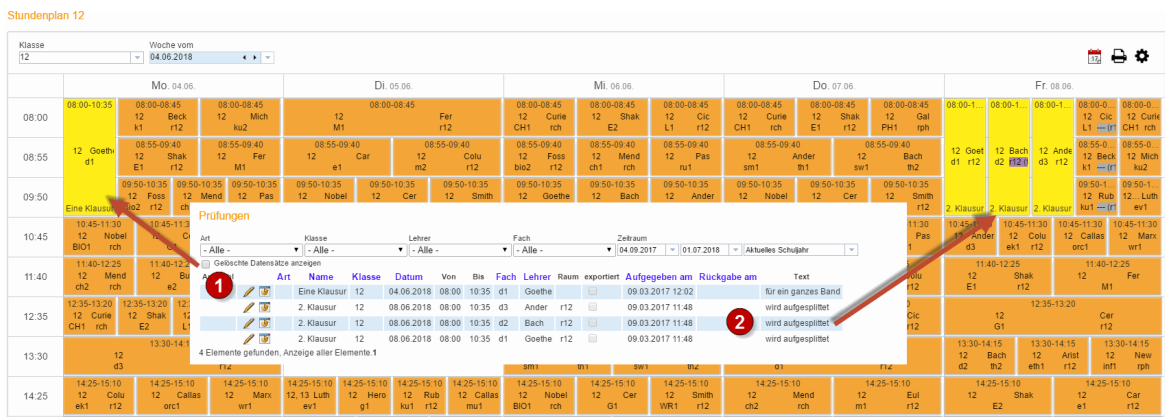
Usually any type of exams are entered by the respective subject teacher into WebUntis and then they are transferred to Untis.

If, however, Untis is used for exam scheduling, it is recommended that instead of generating one exam for one cluster to generate one exam for each course. Then you will see the exams per course, also in WebUntis. An example:



In the above example a single exam (1) was generated on 4 June for cluster d. The figure below shows that only one exam is generated this way in WebUntis.

If, however, an exam is generated the same way for cluster d on 8 June (2 in the above example) but is divided by clicking on the respective button, you will see 3 separate exams also in WebUntis.



## 6 Import / export

Untis provides a number of interfaces which you can use to easily exchange student data, course data and exam scheduling data with other applications.

### Import / Export course data

If the course scheduler and the timetable scheduler are different people and more or less independent of each other and wishing to work with two separate Untis files, this function can be used to transfer course data to the timetable file.

You will find the appropriate menu item 'Import/Export course data' under 'File | Import/Export'.

The export command writes the following course data to a file.

- Subjects (name and long name)
- Courses (underlying lesson)
- Student master data
- Student course choices
- Clusters

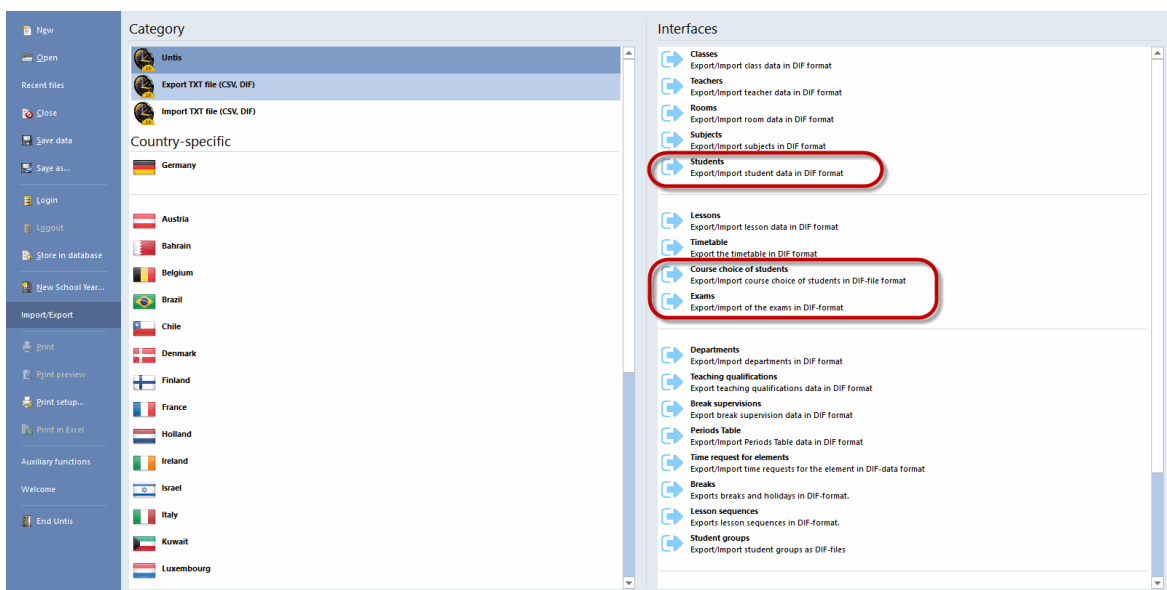
- Cluster conditions

The course file can be imported with the import command, with the lessons being created as additional entries. When importing data you can thus specify that lessons should not be imported. Lessons/courses are then identified by the lesson number. The lesson numbers may not be modified in this case in order to ensure that data can be successfully transferred.

## Import / export of DIF files

You can import and also export the following data records as DIF files (Data Interchange Format).

- Student master data ('GPU010.TXT')
- Course choices ('GPU015.TXT')
- Exam data ('GPU017.TXT')



You will find an exact description of the file structure if you move the cursor to the appropriate menu item and press <F1>.

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