# Lecture Note #15: PivotTables Part #2

# BUSI 201: Business Data Analysis

## **Topic 1. Pivot Tables: Refreshing Data**

One of the reasons that we may favor the use of functions over PivotTables is that functions will automatically update its values when information is edited in the original data. By default, PivotTables do not automatically update, as it does not draw directly from the original data. Instead, PivotTables refer to cached data, so we must manually update the PivotTable.<sup>1</sup>

To learn how to refresh the data on our PivotTables, navigate to worksheet PIVOT-06 of the workbook BUSI201-LEC15-Workbook.xlsx. This worksheet contains a randomly generated gradebook for some class. Suppose that we are interested in analyzing the students' performance data based on their majors and class. Following the steps illustrated in Figure 1.

Departmen	t Student ID	Class	Attendance	Midterm	Final	Quiz	Extra Credit	Total	Average of To	tal Column I	Labels 💌					PivotTable Fields		~
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EXCS	10291	FR	70.6	63.5	81.1	82.6	6	81.1	ARTD				92.14		92.14	Search		
BUSI	11555	SR	100.0	66.0	56.6	87.9	10	80.0	BUSI		76.79		93.29	80.03	85.85			
MATH	18939	SO	100.0	96.8	100.0	62.4	5	96.5	CHEM		91.92		80.35		82.66	Class		
CHEM	19376	SO	62.2	80.1	84.9	95.1	4	87.2	ECON			100.22	93.16		96.69	Attendance Midterm		
ECON	11850	JR	100.0	100.0	100.0	81.1	4	100.2	EXCS		81.06				81.06	Final		
ARTD	18979	SO	92.9	88.6	84.9	91.6	4	92.1	MATH				96.52	87.27	91.89			
MATH	13907	SR	51.0	55.7	97.3	92.6	8	87.3	SPAN		93.91			93.47	93.69	Extra Credit		
ACCT	19548	SO	94.9	69.5	80.1	89.3	1	81.2	Grand Total		85.92	92.24	87.10	83.69	86.70	✓ Total		
SPAN	18734	FR	66.2	100.0	73.2	100.0	8	93.9								More Tables		
BUSI	12104	FR	100.0	94.3	46.9	48.7	10	76.8								Drag fields between areas below:		
CHEM	11703	SO	56.3	61.0	46.1	85.0	10	69.4								T Filters	II Columns	
ACCT	13058	SR	88.0	52.5	71.5	69.2	7	74.0								T Filters	Class	
CHEM	10550	FR	73.0	88.2	70.4	100.0	10	91.9									Child	
BUSI	17412	SO	100.0	77.1	100.0	94.6	1	93.0										
SPAN	14751	SR	100.0	97.6	91.8	87.4	0	93.5										
ACCT	14115	JR	79.9	90.6	71.8	76.8	5	84.3										
BUSI	15691	SO	63.6	94.6	87.3	74.4	9	93.5								E Rows	Σ Values	
CHEM	19632	SO	100.0	97.1	53.6	47.9	7	77.1								Department	<ul> <li>Average of Total</li> </ul>	
																Defer Layout Update		

Figure 1: PIVOT-06

Suppose that there were some last minute changes where some students received extra credit after their final exams. Lets imagine that the student with 0 extra credit in row 19 has completed a task that earned them 10 points extra credit. There is only one senior majoring in Spanish in this dataset, so ideally speaking, the PivotTable should reflect this change.

<sup>&</sup>lt;sup>1</sup>There are macros that will allow us to autmatically update the PivotTable, but this is not within the scope of this course.

Эера	rtment S	tudent ID	Class	Attendance	Midterm	Final	Quiz	Extra Credit	Total	Average of To	tal Colun	nn Labels 🔍					
EC	ON	13413	SO	93.1	75.0	80.9	100.0	9	93.2	Row Labels	I FR	JR	so	SR		Grand Total	
C	HEM	17373	SO	91.6	59.3	100.0	63.4	8	87.6	ACCT			84.26	81.24	73.99		
E	XCS	10291	FR	70.6	63.5	81.1	82.6	6	81.1	ARTD				92.14		92.14	
В	USI	11555	SR	100.0	66.0	56.6	87.9	10	80.0	BUSI		76.79		93.29	80.03	85.85	
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Cł	HEM	19376	SO	62.2	80.1	84.9	95.1	4	87.2	ECON			100.22	93.16		96.69	
EC	CON	11850	JR	100.0	100.0	100.0	81.1	4	100.2	EXCS		81.06				81.06	
A	RTD	18979	SO	92.9	88.6	84.9	91.6	4	92.1	MATH				96.52	87.27	91.89	
м	ATH	13907	SR	51.0	55.7	97.3	92.6	8	87.3	SPAN		93.91			93.47	93.69	
Α	сст	19548	SO	94.9	69.5	80.1	89.3	1	81.2	Grand Total		85.92	92.24	87.10	83.69	86.70	
SI	PAN	18734	FR	66.2	100.0	73.2	100.0	8	93.9								
В	USI	12104	FR	100.0	94.3	46.9	48.7	10	76.8								
Cł	HEM	11703	SO	56.3	61.0	46.1	85.0	10	69.4								
A	сст	13058	SR	88.0	52.5	71.5	69.2	7	74.0								
Cł	HEM	10550	FR	73.0	88.2	70.4	100.0	10	91.9								
	USI	17412	50	100.0	77.1	100.0	94.6	1	93.0								
SI	PAN	14751	SR	100.0	97.6	91.8	87.4	10	103.5								
A	ССТ	14115	JR	79.9	90.6	71.8	76.8	5	84.3								
В	USI	15691	SO	63.6	94.6	87.3	74.4	9	93.5								
Cł	HEM	19632	SO	100.0	97.1	53.6	47.9	7	77.1								

Figure 2: PivotTable Not Synced

See Figure 2. Note that even after updating the original data, the Pivot Table did not update accordingly. If we want the Pivot Table data to be updated, we can manually initiate the process. While there are many ways to initiate this process, and we will be covering three methods.

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	ARTD	18979	SO	92.9	88.6	84.9	91.6	4	92.1	MATH	Show Values As	_	96.52	87.27	91.8
	MATH	13907	SR	51.0	55.7	97.3	92.6	8	87.3		Value Field Settings		50.52	93.47	93.0
	ACCT	19548	SO	94.9	69.5	80.1	89.3	1	81.2		PivotTable <u>Options</u> Hide Fiel <u>d</u> List	92.2	4 87.10	83.69	86.3
	SPAN	18734	FR	66.2	100.0	73.2	100.0	8	93.9	Jiana ro	(IIII) macricig cot	52.2	. 07.10	55.05	00.7

Figure 3: PivotTable Refreshing

First, select any cell on the PivotTable to pull up menu items on the ribbon on the top side of the Excel window. Then, select PivotTable Analyze, and then select Refresh. This should refresh the PivotTable so that the new extra credit score is reflected in the table. The second way of refreshing the PivotTable is also quite simple. Select any cell on the PivotTable, right click once, and select Refresh. The last method is using the hotkey [alt] + [F5] after selecting any cell in the PivotTable.

### **PivotTable Settings: Autofit Columns**

Actually refreshing the table, you may have noticed that the width of each column changed to fit the data in each cell. Suppose you want to keep the width of each cell/column constant even after you refresh the PivotTable. We can change the settings so that they remain the same width after refreshing the data.

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	MATH	18939	SO	100.0	Display fields in report filter area: Down, Then Over			CHEN	Sort	> 92		80.35		82
	CHEM	19376	SO	62.2	Report filter fields per column: 0			ECON	Kemove "Average of Total"		100.22	93.16		96.
	ECON	11850	JR	100.0	For gror values show:			EXCS	Summarize Values By	> 06				81.
	ARTD	18979	SO	92.9	For empty cells show:			MAT	Show Values As	,		96.52	87.27	91
	MATH	13907	SR	51.0	Autofit column widths on update			SPAN	PivotTable Options	91			93.47	93.
	ACCT	19548	SO	94.9	Preserve cell formatting on update			Gran	Hide Field List	92	92.24	87.10	83.69	86.
	SPAN	18734	FR	66.2										
	BUSI	12104	FR	100.0										
	CHEM	11703	SO	56.3										
	ACCT	13058	SR	88.0		Cancel								

Figure 4: PivotTable Options: Autofit

Select any cell on the PivotTable, right click, and select PivotTable Options. Navigating to the Layout&Format tab in the new pop-up window, and deselectAutofit column widths on update. Following this process, the column widths will remain constant each time you update the PivotTable.

## **PivotTable Settings: Manually Sorting Columns**

One thing that bothers me is that the Class is not sorted properly. We as humans understand that the correct order should be FR>SO>JR>SR, but Excel does not. We can manually sort the columns by following a few steps. First move your mouse cursor to the upper border of cell N3 so that the mouse cursor changes to a downward pointing arrow. Left click once, and then move the cursor slightly upward until the cursor changes to a "move" cursor (looks like a + sign with arrows pointing outward). Then, you can click and drag the entire column.

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2 <b>ss</b>	Attendance	Midterm	Final	Quiz	Extra Credit	Total	Average of Total Colur	nn Labels 🖵			_	
3 P	93.1	75.0	80.9	100.0	9	93.2	Row Labels 🔍 FR		JR	so	SR	Grand Total
4 P	91.6	59.3	100.0	63.4	8	87.6	ACCT		84.26	81.24	73.99	79.83
5 R	70.6	63.5	81.1	82.6	6	81.1	ARTD			92.14		92.14
6 R	100.0	66.0	56.6	87.9	10	80.0	BUSI	76.79		93.29	80.03	85.85
7 2	100.0	96.8	100.0	62.4	5	96.5	CHEM	91.92		80.35		82.66
8 2	62.2	80.1	84.9	95.1	4	87.2	ECON		100.22	93.16		96.69
9	100.0	100.0	100.0	81.1	4	100.2	EXCS	81.06				81.06
10 P	92.9	88.6	84.9	91.6	4	92.1	MATH			96.52	87.27	91.89
11 R	51.0	55.7	97.3	92.6	8	87.3	SPAN	93.91			93.47	93.69
12 2	94.9	69.5	80.1	89.3	1	81.2	Grand Total	85.92	92.24	87.10	83.69	86.70
13 1	66.2	100.0	73.2	100.0	8	93.9						

Figure 5: Manually Sorting Pivot Table Columns

# Topic 2. PivotTables: Declaring "Tables"

Recall how we started off building PivotTables. We selected the range that contained the data, and then selected the location where the PivotTable should show up, and we set up the PivotTable using the new menu that pops up. One problem with this approach occurs when we want to add entries to the original data.

Suppose you add a new student to the list in worksheet PIVOT-06, where you already have a Pivot-Table, and then try to update the PivotTable. This new line of data will not be automatically added to the PivotTable, since the range that we selected when setting up the PivotTable does not include the final row. We will learn how to declare tables so that we can fix this problem.

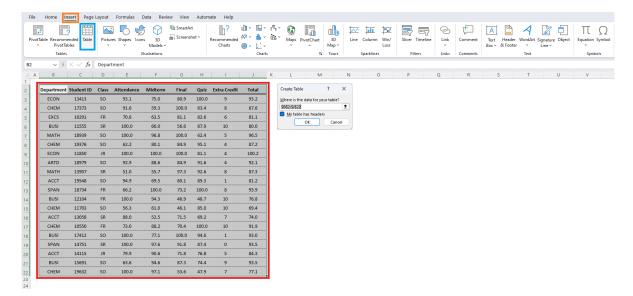


Figure 6: Declaring the Data as a Table

Navigate to the worksheet PIVOT-07, which is a duplicate of the previous worksheet. We will be selecting the dataset we will be working with, and declare it as a table. Select the entire dataset including the variable names at the top row as shown in the red box of Figure 6. Then, navigate to Insert, and then select Table. There are some conditions that should be satisfied for this process to work out:

- 1. No merged cells should be included in the selected dataset.
- 2. There can be no duplicate variable names in the first row.
- 3. All variable names must be included in a single row.

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ECON	13413	so	93.1	75.0	80.9	100.0	9	93.2									
CHEM	17373	SO	91.6	59.3	100.0	63.4	8	87.6									
EXCS	10291	FR	70.6	63.5	81.1	82.6	6	81.1									
BUSI	11555	SR	100.0	66.0	56.6	87.9	10	80.0									
MATH	18939	SO	100.0	96.8	100.0	62.4	5	96.5									
CHEM	19376	SO	62.2	80.1	84.9	95.1	4	87.2									
ECON	11850	JR	100.0	100.0	100.0	81.1	4	100.2									
ARTD	18979	SO	92.9	88.6	84.9	91.6	4	92.1									
MATH	13907	SR	51.0	55.7	97.3	92.6	8	87.3									
ACCT	19548	SO	94.9	69.5	80.1	89.3	1	81.2									
SPAN	18734	FR	66.2	100.0	73.2	100.0	8	93.9									
BUSI	12104	FR	100.0	94.3	46.9	48.7	10	76.8									
CHEM	11703	SO	56.3	61.0	46.1	85.0	10	69.4									
ACCT	13058	SR	88.0	52.5	71.5	69.2	7	74.0									
CHEM	10550	FR	73.0	88.2	70.4	100.0	10	91.9									
BUSI	17412	SO	100.0	77.1	100.0	94.6	1	93.0									
SPAN	14751	SR	100.0	97.6	91.8	87.4	0	93.5									
ACCT	14115	JR	79.9	90.6	71.8	76.8	5	84.3									
BUSI	15691	SO	63.6	94.6	87.3	74.4	9	93.5									
CHEM	19632	SO	100.0	97.1	53.6	47.9	7	77.1									

Figure 7: Declaring the Data as a Table

We can name the table by changing the terms in the red box in Figure 7. We should keep track of this name, as we will be referencing this when we create the PivotTable. If the dataset is correctly declared as a table, you will see filters being automatically added as shown in the orange box in Figure 7.

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	BUSI	11555	SR	100.0	66.0	56.6	87.9	10	80.0	-	ARTD		76.70	92.14			92.14	- 1	Class		
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	CHEM	19376	so	62.2	80.1	84.9	95.1	4	87.2	-	ECON		91.92		100.22		96.69		Midterm     Final		
	ECON	11850	JR	100.0	100.0	100.0	81.1	4	100.2	-	EXCS		81.06		100.22		81.06		Quiz		
	ARTD	18979	so	92.9	88.6	84.9	91.6	4	92.1	-	MATH		81.00	96.52		87.27	91.89		Extra Credit Total		
	MATH	13907	SR	51.0	55.7	97.3	92.6	8	87.3	-	SPAN		93.91	50.52		93.47	93.69		More Tables		
	ACCT	19548	SO	94.9	69.5	80.1	89.3	1	81.2	-	Grand Total			87 10	92.24		86.70				
	SPAN	18734	FR	66.2	100.0	73.2	100.0	8	93.9	-	Grand Total		05.52	07.10	52.24	05.05	00.70		Drag fields between areas below:		
	BUSI	12104	FR	100.0	94.3	46.9	48.7	10	76.8	-									T Filters	III Columns	
	CHEM	11703	SO	56.3	61.0	46.1	85.0	10	69.4	-										Class	
	ACCT	13058	SR	88.0	52.5	71.5	69.2	7	74.0	-											
	CHEM	10550	FR	73.0	88.2	70.4	100.0	10	91.9	-											
	BUSI	17412	SO	100.0	77.1	100.0	94.6	1	93.0	-											
	SPAN	14751	SR	100.0	97.6	91.8	87.4	0	93.5	-										-	
	ACCT	14115	JR	79.9	90.6	71.8	76.8	5	84.3	-									Rows     Department	Σ Values • Average of Total	
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	CHEM	19632	SO	100.0	97.1	53.6	47.9	7	77.1	]											

Figure 8: Generating Pivot Tables with a Table

Select the table that we just declared, and then select Table Design in the ribbon menu. Then, select Summarize with PivotTable. Following all procedures to generate the PivotTable, we can reach the state illustrated in Figure 8. Now lets see what happens when we add a new entry.

Departme	😌 Student I 🖓	Class 🗸	Attendanc 🗸	Midterm 🗸	Final 🗸	Quiz 🗸	Extra Credi 🗸	Total 🗸	Average of Total Colur	nn Labels 💌								
ECON	13413	SO	93.1	75.0	80.9	100.0	9	93.2	Row Labels 🛛 💌 FR		so	JR	SR	Grand Total				
CHEM	17373	SO	91.6	59.3	100.0	63.4	8	87.6	ACCT		81.24	84.26	73.99	79.83				
EXCS	10291	FR	70.6	63.5	81.1	82.6	6	81.1	ARTD		92.14			92.14				
BUSI	11555	SR	100.0	66.0	56.6	87.9	10	80.0	BUSI	76.79	93.29		80.03	85.85				
MATH	18939	SO	100.0	96.8	100.0	62.4	5	96.5	CHEM	91.92	80.35			82.66				
CHEM	19376	SO	62.2	80.1	84.9	95.1	4	87.2	ECON		93.16	100.22		96.69				
ECON	11850	JR	100.0	100.0	100.0	81.1	4	100.2	EXCS	81.06				81.06				
ARTD	18979	SO	92.9	88.6	84.9	91.6	4	92.1	MATH		96.52		87.27	91.89				
MATH	13907	SR	51.0	55.7	97.3	92.6	8	87.3	SPAN	93.91			93.47	93.69				
ACCT	19548	SO	94.9	69.5	80.1	89.3	1	81.2	Grand Total	85.92	87.10	92.24	83.69	86.70				
SPAN	18734	FR	66.2	100.0	73.2	100.0	8	93.9										
BUSI	12104	FR	100.0	94.3	46.9	48.7	10	76.8										
CHEM	11703	SO	56.3	61.0	46.1	85.0	10	69.4										
ACCT	13058	SR	88.0	52.5	71.5	69.2	7	74.0										
CHEM	10550	FR	73.0	88.2	70.4	100.0	10	91.9										
BUSI	17412	SO	100.0	77.1	100.0	94.6	1	93.0										
SPAN	14751	SR	100.0	97.6	91.8	87.4	0	93.5										
ACCT	14115	JR	79.9	90.6	71.8	76.8	5	84.3										
BUSI	15691	SO	63.6	94.6	87.3	74.4	9	93.5										
CHEM	19632	SO	100.0	97.1	53.6	47.9	7	77.1	l i i i i i i i i i i i i i i i i i i i									
ECON	19999	FR	100.0	100.0	100.0	100.0	10	110.0										

Figure 9: Adding Data to a Table

Suppose that we add a student below the very last row of the data. See the entry generated in the red box in Figure 9. Notice that the PivotTable does not automatically update, since the cell that should now have data is empty as shown in the orange box in Figure 9. However, you may have noticed that the table itself has been expanded to include the newest entry, as evidenced by the blue outline expanding to surround the new row.

		D			G	Н			K		М		N	0	Р	Q	PivotTable Fields	
Departmen	پ Student I	Class .	Attendanc 🗸	Midterm 🗸	Final 🗸	Quiz 🗸	Extra Credi 🗸	Total 🗸		Average of Total	Column Lal	bels 👻					Choose fields to add to report:	
ECON	13413	SO	93.1	75.0	80.9	100.0	9	93.2		Row Labels 💽	FR		so	JR	SR	Grand Total	Search	
CHEM	17373	SO	91.6	59.3	100.0	63.4	8	87.6		ACCT			81.24	84.26	73.99	79.83		
EXCS	10291	FR	70.6	63.5	81.1	82.6	6	81.1		ARTD			92.14			92.14	Department     Student ID	
BUSI	11555	SR	100.0	66.0	56.6	87.9	10	80.0		BUSI		76.79	93.29		80.03	85.85	Class	
MATH	18939	SO	100.0	96.8	100.0	62.4	5	96.5	1	CHEM		91.92	80.35			82.66	Attendance Midterm	
CHEM	19376	SO	62.2	80.1	84.9	95.1	4	87.2	1	ECON		110.00	93.16	100.22		101.13	Final	
ECON	11850	JR	100.0	100.0	100.0	81.1	4	100.2	1	EXCS		81.06				81.06	Quiz	
ARTD	18979	SO	92.9	88.6	84.9	91.6	4	92.1	1	MATH			96.52		87.27	91.89	Extra Credit  Total	
MATH	13907	SR	51.0	55.7	97.3	92.6	8	87.3	1	SPAN		93.91			93.47	93.69	More Tables	
ACCT	19548	SO	94.9	69.5	80.1	89.3	1	81.2	1	Grand Total		90.74	87.10	92.24	83.69	87.81		
SPAN	18734	FR	66.2	100.0	73.2	100.0	8	93.9	1								Drag fields between areas below:	
BUSI	12104	FR	100.0	94.3	46.9	48.7	10	76.8	1								T Filters II Columns	
CHEM	11703	SO	56.3	61.0	46.1	85.0	10	69.4	1								Class	
ACCT	13058	SR	88.0	52.5	71.5	69.2	7	74.0	1									
CHEM	10550	FR	73.0	88.2	70.4	100.0	10	91.9	1									
BUSI	17412	SO	100.0	77.1	100.0	94.6	1	93.0										
SPAN	14751	SR	100.0	97.6	91.8	87.4	0	93.5	1									
ACCT	14115	JR	79.9	90.6	71.8	76.8	5	84.3	1								Rows     Department     Average of	
BUSI	15691	SO	63.6	94.6	87.3	74.4	9	93.5	1								Vepartment ~ Average of	lotai
CHEM	19632	SO	100.0	97.1	53.6	47.9	7	77.1	1									
ECON	19999	FR	100.0	100.0	100.0	100.0	10	110.0	1									
									4									

Figure 10: Updated PivotTable

Refresh the Pivot Table using any of the three methods we learned in the previous section. You should notice that the newly added row is now added in the Pivot Table, as the entry shows up in the <u>orange box</u> in Figure 10.

# Topic 3. PivotTables: Formatting

While there are many formatting options available for PivotTables, we will be covering some of the basic ones that will be useful in real-world scenarios in this chapter. Navigate to worksheet PIVOT-08 for an expanded version of the gradebook from the previous worksheets.

▲ A	В	С	D	E	F	G	Н	1	J	К	L M	N		0	P	Q	R	S T	1	PivotTable Fields		· ×
	Department	Student ID	Class	Attendance	Midterm	Final	Quiz	Extra Credit H	asCredit	Total	Average of Total	Column Labe	ls 👻						н	Choose fields to add to report:		~ &~
3	ECON	13413	SO	93.1	75.0	80.9	100.0	9	1	93.2	Row Labels 🔄	FR	J	R	so	SR	Grand Total				L	
4	CHEM	17373	50	91.6	59.3	100.0	63.4	8	1	87.6	ACCT	90.199	03521	84.25503722	80.49997159	76.28255870	5 81.97180831		н	Search		9
5	EXCS	10291	FR	70.6	63.5	81.1	82.6	6	1	81.1	ARTD	86.180	35234	82.38811131	86.14381325		85.53020929			Department		-
6	BUSI	11555	SR	100.0	66.0	56.6	87.9	10	1	80.0	BUSI	81.641	18281	87.27540015	93.29143588	73.04038625	83.08125966			Student ID		
7	MATH	18939	SO	100.0	96.8	100.0	62.4	5	1	96.5	CHEM	77.191	10851	86.49057939	85.47927373	84.77911976	83.80168515			Class		
8	CHEM	19376	SO	62.2	80.1	84.9	95.1	4	1	87.2	ECON	77.81	71997	82.63920561	82.12111888	78.1064632	80.34720089			Attendance Midterm		
9	ECON	11850	JR	100.0	100.0	100.0	81.1	4	1	100.2	EXCS	84.865	77408	82.38631955		86.28511378	83.82726627			Final		
0	ARTD	18979	SO	92.9	88.6	84.9	91.6	4	1	92.1	MATH			102.0606989	96.51972851	88.58784497	93.93902933			Quiz		
11	MATH	13907	SR	51.0	55.7	97.3	92.6	8	1	87.3	PSYC	80.43	56894	78.6687282	87.14852952	82.41532459	83.16356025			Extra Credit		
12	ACCT	19548	SO	94.9	69.5	80.1	89.3	1	1	81.2	SPAN	87.612	50565	91.45793455	94.15977606	81.90181389	87.12064754			HasCredit		
13	SPAN	18734	FR	66.2	100.0	73.2	100.0	8	1	93.9	Grand Total	83.427	34685	84.67021979	86.01139578	81.04270365	83.87598766			Total More Tables		
14	BUSI	12104	FR	100.0	94.3	46.9	48.7	10	1	76.8										More rables		
15	CHEM	11703	50	56.3	61.0	46.1	85.0	10	1	69.4												
6	ACCT	13058	SR	88.0	52.5	71.5	69.2	7	1	74.0										Drag fields between areas belo	N.	
7	CHEM	10550	FR	73.0	88.2	70.4	100.0	10	1	91.9										T Filters	Columns	
8	BUSI	17412	SO	100.0	77.1	100.0	94.6	1	1	93.0										T hitters	Class	~
9	SPAN	14751	SR	100.0	97.6	91.8	87.4	0	0	93.5											Cass	
0	ACCT	14115	JR	79.9	90.6	71.8	76.8	5	1	84.3												
1	BUSI	15691	SO	63.6	94.6	87.3	74.4	9	1	93.5												
12	CHEM	19632	SO	100.0	97.1	53.6	47.9	7	1	77.1												
23	ECON	14076	JR	100.0	71.8	87.6	64.2	1	1	80.4										E Rows	Σ Values	
24	CHEM	19184	SO	62.1	90.5	100.0	100.0	7	1	100.4										Department *	Average of Total	*
25	SPAN	19612	FR	100.0	76.4	79.1	100.0	9	1	93.6												
16	ECON	15230	JR	100.0	59.4	57.7	56.1	7	1	69.1												
7	CHEM	15412	FR	100.0	49.6	74.7	100.0	7	1	81.7												
	EXCS	14608	SR	100.0	100.0	52.5	100.0	6	1	87.0												

Figure 11: Default PivotTable

### **Number Formats**

For most purposes, we do not need any more than 2 decimal points. We can change the formatting of the cells in the PivotTable to make the table more readable. Simply select any cell on the PivotTable, right click, and select Value Field Settings. Then, click on Number Format to call up the formatting window in the orange box. You can change the format of the numbers in this window, and apply the effect to the entire PivotTable.

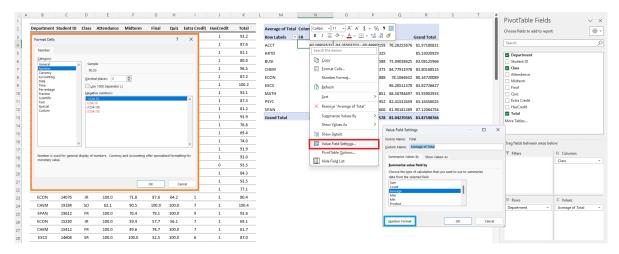


Figure 12: Number Formats

### **Report Layout**

The default layout of the table is Compact, which minimizes the number of columns by stacking variables in a single column. Although it has its advantages, it is often better to experiment with other layouts. Lets edit the PivotTable to be a bit more complex for our future analysis.

Home In:	sert Page	Layout	Formulas D	ata Revie	w View		te Help	PivotTable Ar		-									Comments	8
otals Grand	Report Bl Layout ~ Ro	ank 🔽	Row Headers Column Header	Bander							× ×									
Layor	Layour - Inor	eva ·		Style Option	15				PivotTable Styl											
~ 1	E Sho	w in <u>C</u> ompa	act Form																	
	To Sha	w in Outlin	e Form																	
В	Jiig	w in outin	c rom	F	G	н	1	1	К	L M	N	0	P	Q R	S	Т	U	PivotTable F	ields	
Department	Sho	w in <u>T</u> abula	ar Form	Midterm	Final	Ouiz	Extra Credit	HasCredit	Total	Average of Tota	I Column Labels 👻									
ECON				75.0	80.9	100.0	9	1	93.2	Row Labels		1	Grand Total					Choose fields to add	to report:	
CHEM	Bep	eat All Iten	n Labels	59.3	100.0	63.4	8	1	87.6	ACCT		-	81.97180831					Search		
EXCS	Do I	Not Repeat	t Item Labels	63.5	81.1	82.6	6	1	81.1	FR			90.19903521					Department		
BUSI		on	100.0	66.0	56.6	87.9	10	1	80.0	JR			84.25503722					Student ID		
MATH	18939	SO	100.0	96.8	100.0	62.4	5	1	96.5	so			80.49997159					Class		
CHEM	19376	SO	62.2	80.1	84.9	95.1	4	1	87.2	SR		76.28255876	76.28255876					Attendance		
ECON	11850	JR	100.0	100.0	100.0	81.1	4	1	100.2	ARTD	79.30170059	88.64446364	85.53020929					Midterm     Einal		
ARTD	18979	SO	92.9	88.6	84.9	91.6	4	1	92.1	FR	83.77962563	88.58207904	86.18085234					Quiz		
MATH	13907	SR	51.0	55.7	97.3	92.6	8	1	87.3	JR		82.38811131	82.38811131					Extra Credit		
ACCT	19548	SO	94.9	69.5	80.1	89.3	1	1	81.2	so	74.82377554	91.8038321	86.14381325					HasCredit		
SPAN	18734	FR	66.2	100.0	73.2	100.0	8	1	93.9	BUSI	75.45446311	84.9879588	83.08125966					Total More Tables		
BUSI	12104	FR	100.0	94.3	46.9	48.7	10	1	76.8	FR		81.64118281	81.64118281					Wore tables		
CHEM	11703	SO	56.3	61.0	46.1	85.0	10	1	69.4	JR	88.19664436	86.81477805	87.27540015							
ACCT	13058	SR	88.0	52.5	71.5	69.2	7	1	74.0	so		93.29143588	93.29143588					Drag fields between	areas below:	
CHEM	10550	FR	73.0	88.2	70.4	100.0	10	1	91.9	SR	62.71228186	78.20443844	73.04038625					T Filters	III Column	05
BUSI	17412	SO	100.0	77.1	100.0	94.6	1	1	93.0	CHEM	80.45724209	83.99841709	83.80168515						HasCredit	
SPAN	14751	SR	100.0	97.6	91.8	87.4	0	0	93.5	FR		77.19110851	77.19110851							
ACCT	14115	JR	79.9	90.6	71.8	76.8	5	1	84.3	JR		86.49057939	86.49057939							
BUSI	15691	SO	63.6	94.6	87.3	74.4	9	1	93.5	so			85.47927373							
CHEM	19632	SO	100.0	97.1	53.6	47.9	7	1	77.1	SR	80.45724209									
ECON	14076	JR	100.0	71.8	87.6	64.2	1	1	80.4	ECON			80.34720089					= Rows	Σ Values	
CHEM	19184	SO	62.1	90.5	100.0	100.0	7	1	100.4	FR			77.8171997					Department	<ul> <li>Average or</li> </ul>	f Total
SPAN	19612	FR	100.0	76.4	79.1	100.0	9	1	93.6	JR			82.63920561					Class	-	
ECON	15230	JR	100.0	59.4	57.7	56.1	7	1	69.1	SO			82.12111888							
CHEM	15412 14608	FR	100.0	49.6	74.7	100.0	7	1	81.7	SR EXCS			78.1064632 83.82726627							

Figure 13: Layouts

The default layout of PivotTables is the Compact layout, which minimizes the number of columns by placing all row variables in one column. This format takes up less space, but it is not optimal for data analysis purposes. We want each row variable to populate its own column, since we may have to set up conditions based on these variables. Select **Design**, and then **Report Layout**, and select **Show in Tabular Form**.

	В	С	D	E		G	н		1	K	L M	N	0	P	Q	2	S	T U	i i	vivotTable Field	s	
Depa	rtment Stu	udent ID	Class	Attendance	Midterm	Final	Quiz	Extra Credit	HasCredit	Total	Average of Total	]	HasCredit 💌							hoose fields to add to rep	ort	
EC	ON :	13413	50	93.1	75.0	80.9	100.0	9	1	93.2	Department	Class 💌	0	1	Grand Total							
C		17373	SO	91.6	59.3	100.0	63.4	8	1	87.6	ACCT	FR		90.19903521	90.19903521					Search		
E		10291	FR	70.6	63.5	81.1	82.6	6	1	81.1		JR		84.25503722	84.25503722					Department		
В	USI :	11555	SR	100.0	66.0	56.6	87.9	10	1	80.0		so		80.49997159	80.49997159					Student ID		
м	ATH :	18939	SO	100.0	96.8	100.0	62.4	5	1	96.5		SR		76.28255876	76.28255876					Class		
CI	HEM :	19376	SO	62.2	80.1	84.9	95.1	4	1	87.2	ACCT Total			81.97180831	81.97180831					Attendance Midterm		
EC	CON :	11850	JR	100.0	100.0	100.0	81.1	4	1	100.2	ARTD	FR	83.77962563	88.58207904	86.18085234					Final		
A	RTD :	18979	SO	92.9	88.6	84.9	91.6	4	1	92.1		JR		82.38811131	82.38811131					Quiz		
м	ATH :	13907	SR	51.0	55.7	97.3	92.6	8	1	87.3		so	74.82377554	91.8038321	86.14381325					Extra Credit		
A	сст :	19548	SO	94.9	69.5	80.1	89.3	1	1	81.2	ARTD Total		79.30170059	88.64446364	85.53020929					HasCredit		
SF	PAN :	18734	FR	66.2	100.0	73.2	100.0	8	1	93.9	BUSI	FR		81.64118281	81.64118281					Total  fore Tables		
	USI :	12104	FR	100.0	94.3	46.9	48.7	10	1	76.8		JR	88.19664436	86.81477805	87.27540015					nore lables		
CI		11703	so	56.3	61.0	46.1	85.0	10	1	69.4		so		93.29143588	93.29143588							
A	сст :	13058	SR	88.0	52.5	71.5	69.2	7	1	74.0		SR	62.71228186	78.20443844	73.04038625					Drag fields between areas I	elow:	
Cł	HEM	10550	FR	73.0	88.2	70.4	100.0	10	1	91.9	BUSI Total		75.45446311	84.9879588	83.08125966					T Filters	II Columns	
в	USI :	17412	SO	100.0	77.1	100.0	94.6	1	1	93.0	⊟ снем	FR		77.19110851	77.19110851					T hilters	HasCredit	
SF	PAN :	14751	SR	100.0	97.6	91.8	87.4	0	0	93.5		JR		86.49057939	86.49057939						Hiscredit	
A	сст :	14115	JR	79.9	90.6	71.8	76.8	5	1	84.3		so		85.47927373	85.47927373							
В	USI :	15691	SO	63.6	94.6	87.3	74.4	9	1	93.5		SR	80.45724209	86.94005859	84.77911976							
Cł	HEM :	19632	SO	100.0	97.1	53.6	47.9	7	1	77.1	CHEM Total		80.45724209	83.99841709	83.80168515							
	ON :	14076	JR	100.0	71.8	87.6	64.2	1	1	80.4	BECON	FR		77.8171997	77.8171997					Rows	Σ Values	
Cł		19184	SO	62.1	90.5	100.0	100.0	7	1	100.4		JR		82.63920561	82.63920561					Department	Average of To	0
SF		19612	FR	100.0	76.4	79.1	100.0	9	1	93.6		so		82.12111888	82.12111888					Class		
EC	ON :	15230	JR	100.0	59.4	57.7	56.1	7	1	69.1		SR		78.1064632	78.1064632							
Cł	HEM :	15412	FR	100.0	49.6	74.7	100.0	7	1	81.7	ECON Total			80.34720089	80.34720089							
E	xcs :	14608	SR	100.0	100.0	52.5	100.0	6	1	87.0	Excs	FR		84,86577408	84.86577408							

Figure 14: Tabular Layout

### **Other Options**

The readers are encouraged to try out other formatting options in the Design tab. There are options that allow you to enable/disable the subtotals for each category in the red box. You can also generate or remove grand totals which take up the very last row/column of each PivotTable in the blue box.

File	Home In	nsert Page	Layout	Formulas	Data Revie	w View	Autom	nate Help	PivotTable A	nalyze <u>De</u>	sign				
Subto	tals Grand Totals ~	Report Blar Layout ~ Row	nk 🗸	] Row Headers ] Column Header	Banded								· · · · · · · · · · · · · · · · · · ·		
	Layout PivotTable Style Options					PivotTable Styles									
2	~ :	$\times \checkmark f_x$	Averag	e of Total											
А	В	С	D	E	F	G	Н	1	J	К	L	М	N	0	Р
	Department	Student ID	Class	Attendance	Midterm	Final	Quiz	Extra Credit	HasCredit	Total		Average of Tota	Column Labels 👻		
	ECON	13413	SO	93.1	75.0	80.9	100.0	9	1	93.2	-	Row Labels		1	Grand Tota
	CHEM	17373	SO	91.6	59.3	100.0	63.4	8	1	87.6		⊟АССТ		81.97180831	81.971808
	EXCS	10291	FR	70.6	63.5	81.1	82.6	6	1	81.1		FR		90.19903521	90.199035
	BUSI	11555	SR	100.0	66.0	56.6	87.9	10	1	80.0		JR		84.25503722	84.255037
	MATH	18939	SO	100.0	96.8	100.0	62.4	5	1	96.5		SO		80.49997159	80.499971
	CHEM	19376	SO	62.2	80.1	84.9	95.1	4	1	87.2		SR		76.28255876	76.282558
	ECON	11850	JR	100.0	100.0	100.0	81.1	4	1	100.2		= ARTD	79.30170059	88.64446364	85.530209
	ARTD	18979	SO	92.9	88.6	84.9	91.6	4	1	92.1		FR	83.77962563	88.58207904	86.180852
	MATH	13907	SR	51.0	55.7	97.3	92.6	8	1	87.3		JR		82.38811131	82.388111
	ACCT	19548	SO	94.9	69.5	80.1	89.3	1	1	81.2		SO	74.82377554	91.8038321	86.143813
	SPAN	18734	FR	66.2	100.0	73.2	100.0	8	1	93.9		🗏 BUSI	75.45446311	84.9879588	83.081259
	BUSI	12104	FR	100.0	94.3	46.9	48.7	10	1	76.8		FR		81.64118281	81.641182
	CHEM	11703	SO	56.3	61.0	46.1	85.0	10	1	69.4		JR	88.19664436	86.81477805	87.275400
	ACCT	13058	SR	88.0	52.5	71.5	69.2	7	1	74.0		SO		93.29143588	93.291435
	CHEM	10550	FR	73.0	88.2	70.4	100.0	10	1	91.9		SR	62.71228186	78.20443844	73.040386
	BUSI	17412	SO	100.0	77.1	100.0	94.6	1	1	93.0		🗏 СНЕМ	80.45724209	83.99841709	83.801685
	SPAN	14751	SR	100.0	97.6	91.8	87.4	0	0	93.5		FR		77.19110851	77.191108
	ACCT	14115	JR	79.9	90.6	71.8	76.8	5	1	84.3		JR		86.49057939	86.490579

Figure 15: Other Options

The options in the orange box allows you to add an empty row between categories, and the options in the green box automatically shades alternating rows/columns which assist on reading tables. To change the colors or borders of the PivotTable, you should look into the options in the purple box.