



UNIVERSITÀ  
DEGLI STUDI  
DI BERGAMO

Dipartimento  
di Ingegneria Gestionale,  
dell'Informazione e della Produzione

# 22059 – APPLIED TOPICS IN MANAGEMENT ENGINEERING

**Excel, Access and Matlab**

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# AGENDA

## Lecture VIII



- QUERIES
  - How to create a query
  - Simple Select queries
  - How to create a Simple Select query
  - How to modify a query
  - How to enter multiple criteria
  - Saving the output of a query
  - Wildcards in Access
  - Simple Calculation queries
  - How to create a Simple Calculation query
- FURTHER MATERIAL

# QUERIES

- A query is a set of instructions used for working with data.
- It allows to sort, group, delete, order, update, extract etc. information within a database.
- It is defined in SQL language.
- Queries can be divided into:
  - Select queries
  - Calculation (or Total) queries
  - Parameter queries
  - Action queries
  - Crosstab queries



# QUERIES

- They may also be distinguished into:
  - Simple queries → A simple query might use all or some of the fields in a table.
  - Complex queries → A complex query can be constructed on more than one base table. It can contain join conditions, a group by clause, an order by clause etc.



# QUERIES

## How to create a query

- Click on Create Tab.
- Select “Query Design” from Queries group.
- The *New query window* will appear.
- Select “ Simple query design” and then ok.
- Now you can choose the fields that you want to include in the query.
- Select Next.

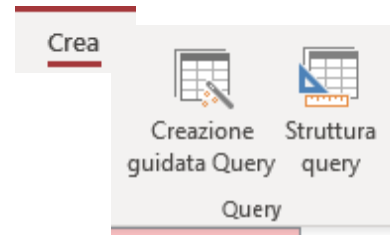


Fig.1: “Query Design” group

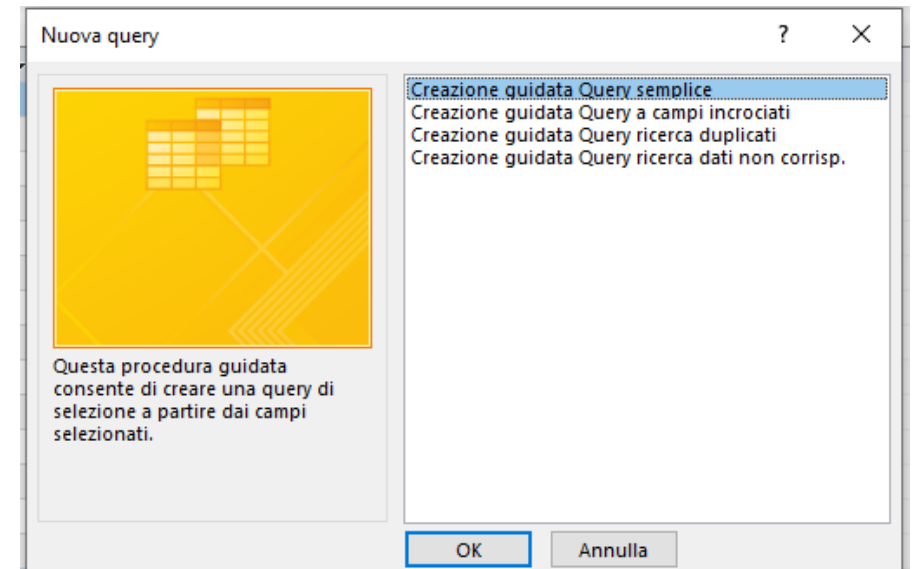


Fig.2: New query window

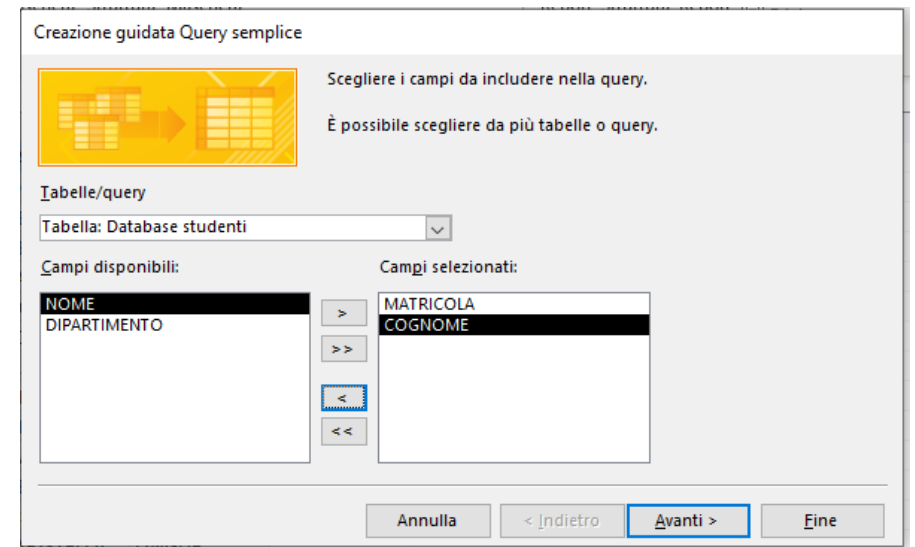


Fig.3: Selection of fields

# QUERIES

## How to create a query

- Select “modify query structure”.
- Click on Next.
- In the following window you can choose “overview” to add conditions.

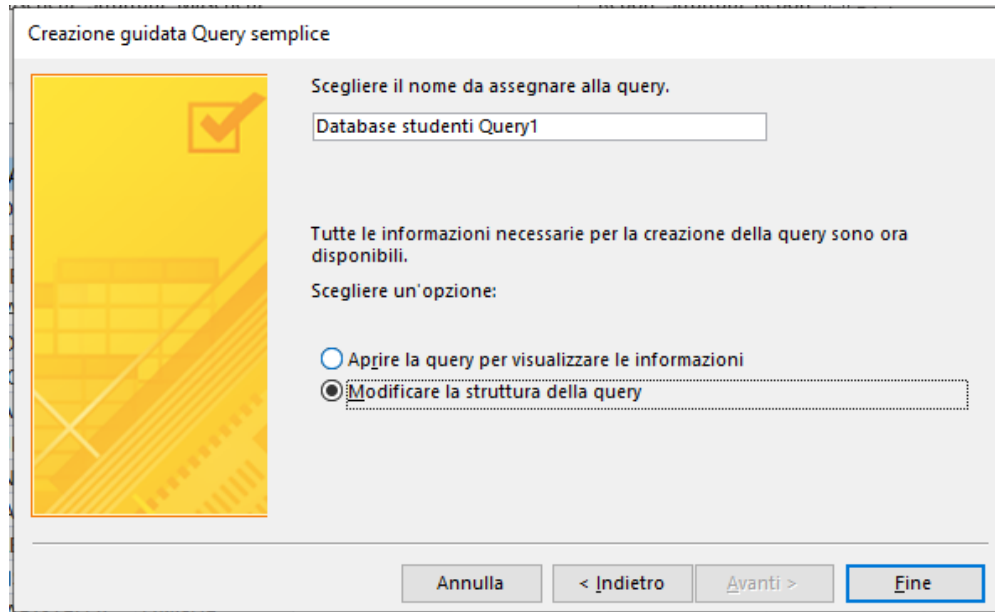


Fig.4: Modify query structure

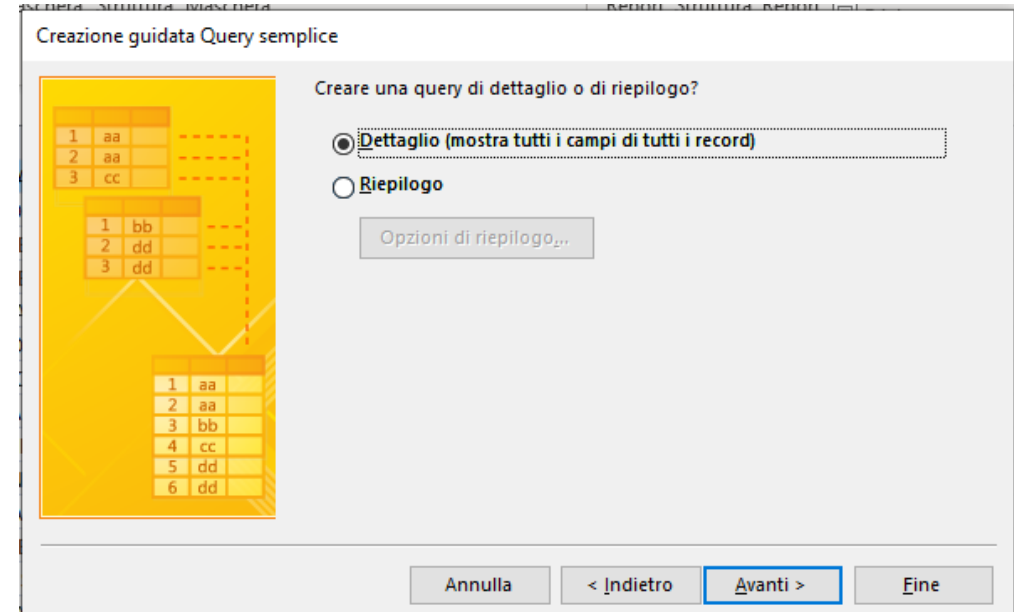
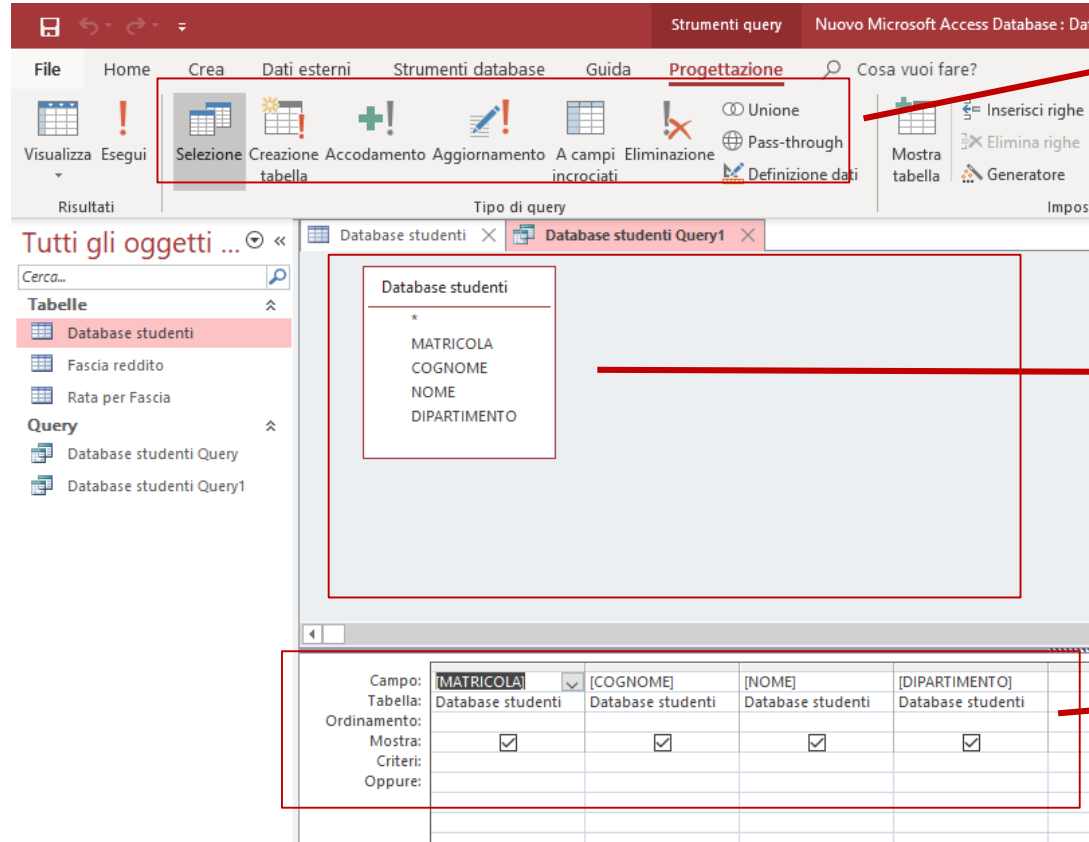


Fig.5: Overview

# QUERIES

## How to create a query



Selecting the type of query

Tables involved in the query and relationship between them

Changing query parameters

Fig.6: Interface

## QUERIES

### Simple Select queries

- A select query is the most basic type of Access query.
- It is used to select data that meets a certain condition from a database.
- Access also provides a function which allows you to create a query in a guided way.
- They do not change data.

Example:

- *You have to extract the Freshman, First name and Last name of all engineering students.*





## QUERIES

### How to create a Simple Select query

- In Design Tab, click on “Select”.
- Now, add the criterion you are searching for in the Criteria row in the Query Builder.

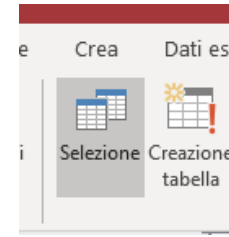
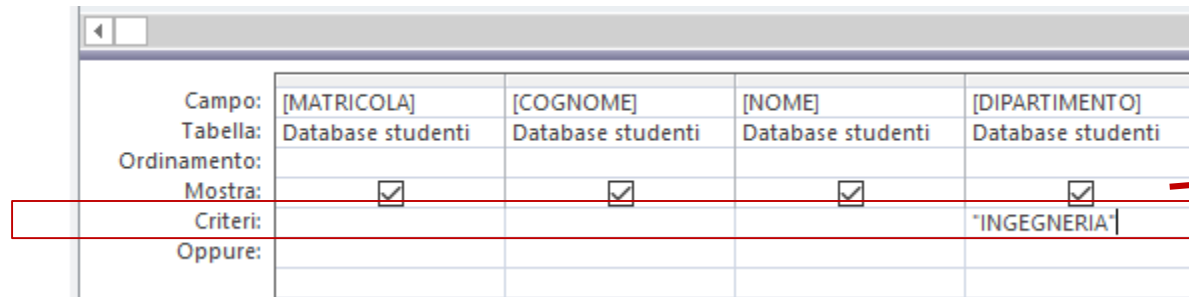


Fig.7: Select in Design Tab

A screenshot of the Microsoft Access Query Builder. The table shows the following fields and their settings:

Campo:	[MATRICOLA]	[COGNOME]	[NOME]	[DIPARTIMENTO]
Tabella:	Database studenti	Database studenti	Database studenti	Database studenti
Ordinamento:				
Mostra:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteri:				"INGEGNERIA"
Oppure:				

A red box highlights the 'Mostra' row, and a red arrow points from the text 'Selection of fields to show' to this row.

Selection of fields to show

Fig.8: Query Builder

- The order of the fields in the Query Builder is the same as the one that will be shown in the query output.
- The boxes selected in the Show row will be visible in the query output.

# QUERIES

## How to create a Simple Select query

- Now, click on Run.
- The query will be run.

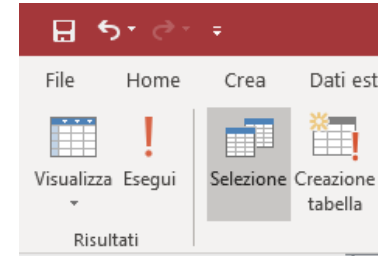


Fig.9: Run in Results group

- The query result will open

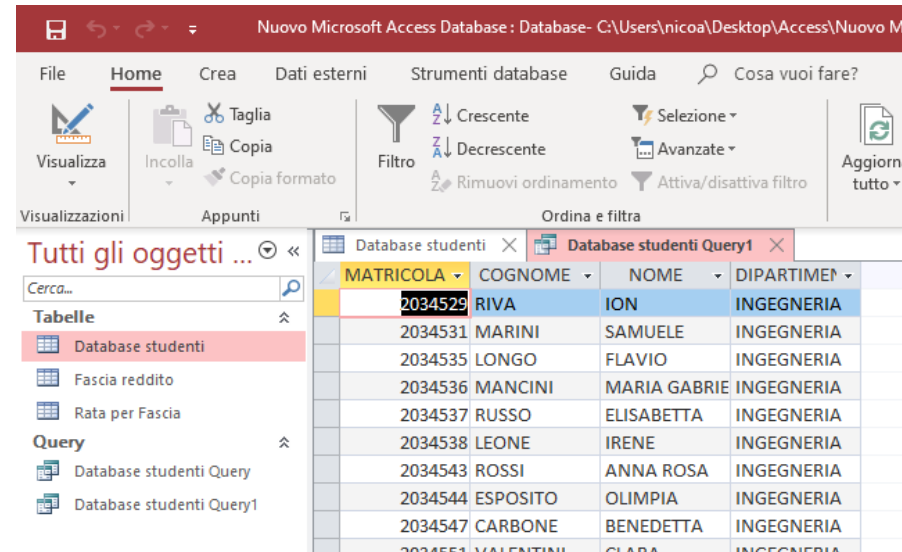


Fig.10: Output of the query

## QUERIES

### How to create a Simple Select query



- You can view the SQL code of the newly executed query.

How? - In *Results* group of Design Tab, click on View.  
- Select View SQL

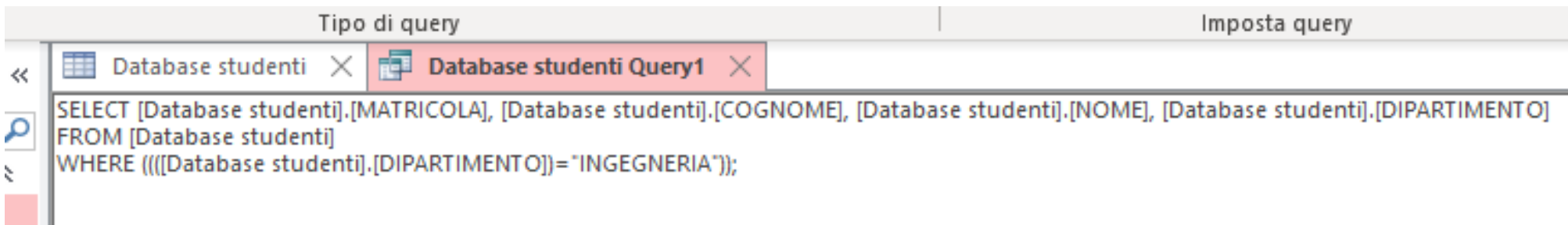


Fig.11: SQL visualization

- SELECT → Fields shown.
- FROM → Starting table in which to search.
- WHERE → Criterion to be met.

## QUERIES

### How to modify a query

- Now, you want to sort the results alphabetically.
- To modify the query, you have to:
  - Right-click on the query name.
  - Select View Structure.
  - In the Sort row, click the dropdown and select «Ascending» in the fields you want.
- Now, if you run the modified query, the results will be sorted in ascending order first by last name and then by first name.



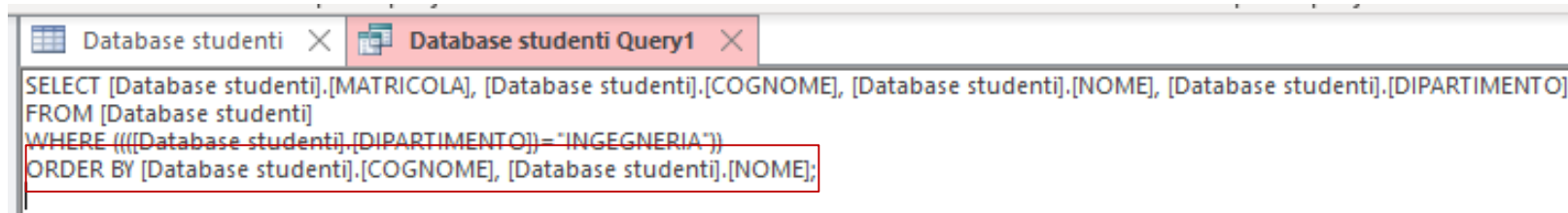
Campo:	[MATRICOLA]	[COGNOME]	[NOME]	[DIPARTIMENTO]
Tabella:	Database studenti	Database studenti	Database studenti	Database studenti
Ordinamento:		Crescente	Crescente	
Mostra:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteri:				"INGEGNERIA"
Oppure:				

Fig.12: Sorting in the Query Builder

## QUERIES

### How to modify a query

- SQL visualization:



```
Database studenti x Database studenti Query1 x
SELECT [Database studenti].[MATRICOLA], [Database studenti].[COGNOME], [Database studenti].[NOME], [Database studenti].[DIPARTIMENTO]
FROM [Database studenti]
WHERE ((([Database studenti].[DIPARTIMENTO])="INGEGNERIA"))
ORDER BY [Database studenti].[COGNOME], [Database studenti].[NOME];
```

Fig.13: ORDER BY in SQL

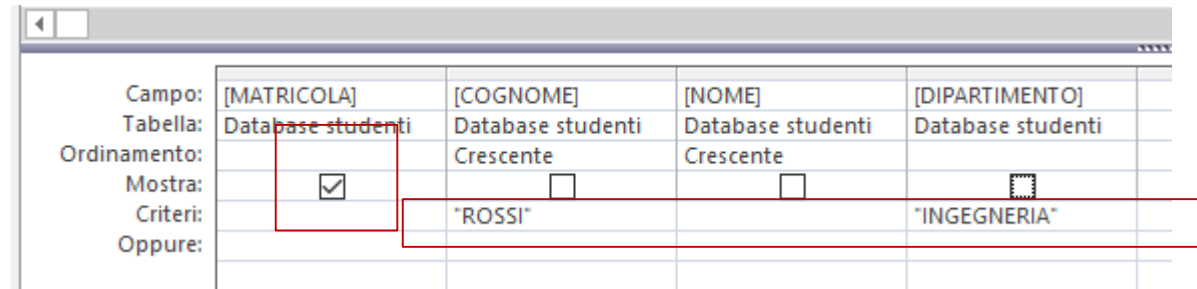


- You can modify the query by using this view, but it is more complex than by using the Query Builder.
- Can multiple criteria be entered?

## QUERIES

### How to enter multiple criteria

- In Access you can enter criteria in AND or OR.
- For in AND conditions, the criteria should be entered in the Criteria row of the Query Builder:

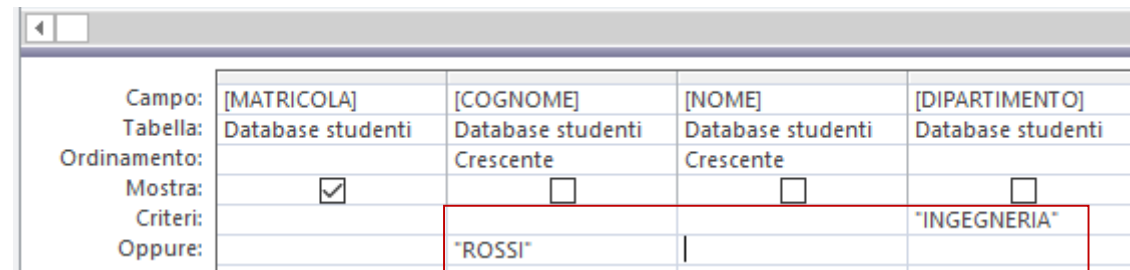


The screenshot shows the Microsoft Access Query Builder interface. The table below represents the data entered in the 'Criteria' row. A red box highlights the 'Criteria' row, and another red box highlights the 'Mostra' row for the first field, indicating that the criteria are applied to the visible fields.

Campo:	[MATRICOLA]	[COGNOME]	[NOME]	[DIPARTIMENTO]
Tabella:	Database studenti	Database studenti	Database studenti	Database studenti
Ordinamento:		Crescente	Crescente	
Mostra:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Criteria:		"ROSSI"		"INGEGNERIA"
Oppure:				

Fig.14: Select the Freshman of students with last name "ROSSI" enrolled in Engineering

- For in OR conditions, the criteria should be entered in the OR row of the Query Builder:



The screenshot shows the Microsoft Access Query Builder interface. The table below represents the data entered in the 'Criteria' and 'Oppure' rows. A red box highlights the 'Criteria' and 'Oppure' rows, indicating that the criteria are applied to the visible fields.

Campo:	[MATRICOLA]	[COGNOME]	[NOME]	[DIPARTIMENTO]
Tabella:	Database studenti	Database studenti	Database studenti	Database studenti
Ordinamento:		Crescente	Crescente	
Mostra:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Criteria:				"INGEGNERIA"
Oppure:		"ROSSI"		

Fig.15: Select the Freshman of students with last name "ROSSI" or enrolled in Engineering

## QUERIES

### Saving the output of a query

- The output of a query can be saved in a table.
- From Design Tab, in “Query Type” group select Make table.
- *Table creation* window will appear.
- In Table name field enter the name under which you want to save the table.
- Click on OK.

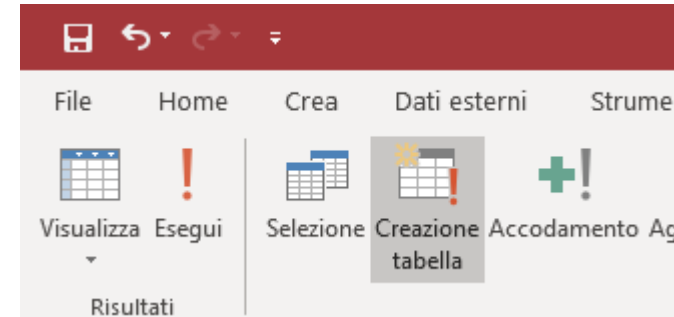


Fig.16: Make table in “Query Type” group

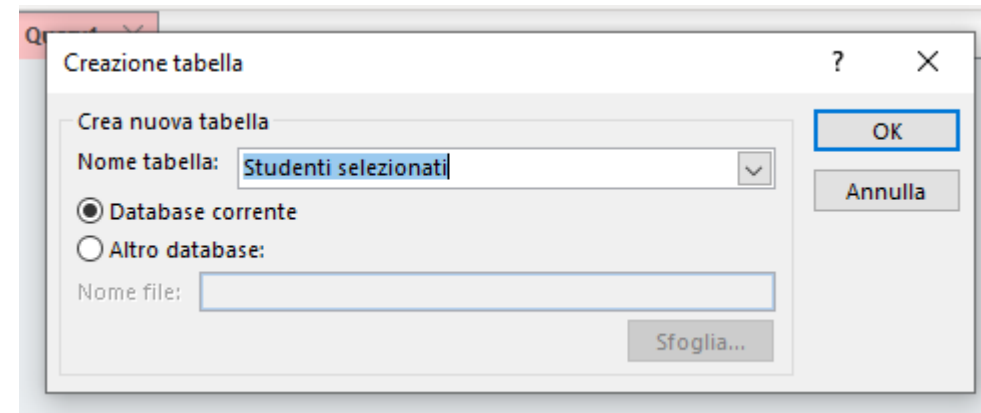
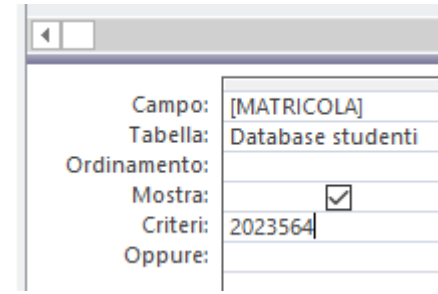


Fig.17: Table creation window

## QUERIES

### Wildcards in Access (Caratteri Jolly)

- If you want to search a numeric data, you have to enter it into Criteria row without quotes.



The screenshot shows a search criteria dialog box in Microsoft Access. The fields are: Campo: [MATRICOLA], Tabella: Database studenti, Ordinamento: (empty), Mostra: , Criteri: 2023564, Oppure: (empty).



Fig.18: Search for a numeric data

- Wildcards are special characters that can stand in for unknown characters in a text value.
  - \* → Matches any number of characters. You can use the asterisk (\*) as the first or last character of the string.
  - ? → Matches a single alphabet in a specific position.
  - [] → Matches characters within the brackets.
  - ! → Excludes characters inside the brackets.
  - - → Matches a range of characters. Remember to specify the characters in ascending order.
  - # → Matches any single numeric character.



## QUERIES

### Simple Calculation queries

- A calculation query allows to perform mathematical operations on a data set.
  - Count
  - Sum
  - Average
  - StDev
  - Maximum
  - Minimum
  - Group by



Example:

- *You have to count the number of students for each department.*

## QUERIES

### How to create a Simple Calculation query

- From Design Tab, in “Show/Hide” group click on Totals.
- Select the fields you want to show.
- In the Total row (Formula), choose the action you want for each field.

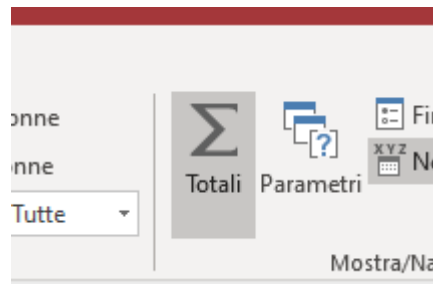


Fig.19: Totals in Show/Hide group

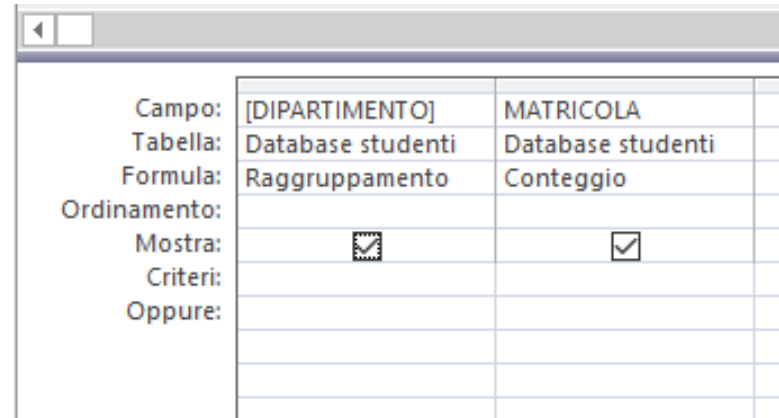


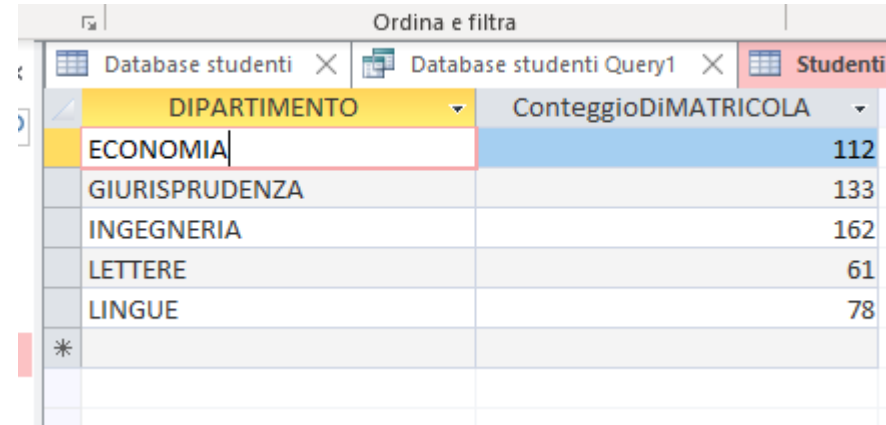
Fig.20: Actions for each field

- In doing so, the query will go to count for each department the number of freshmen and, thereby, of students.

## QUERIES

### How to create a Simple Calculation query

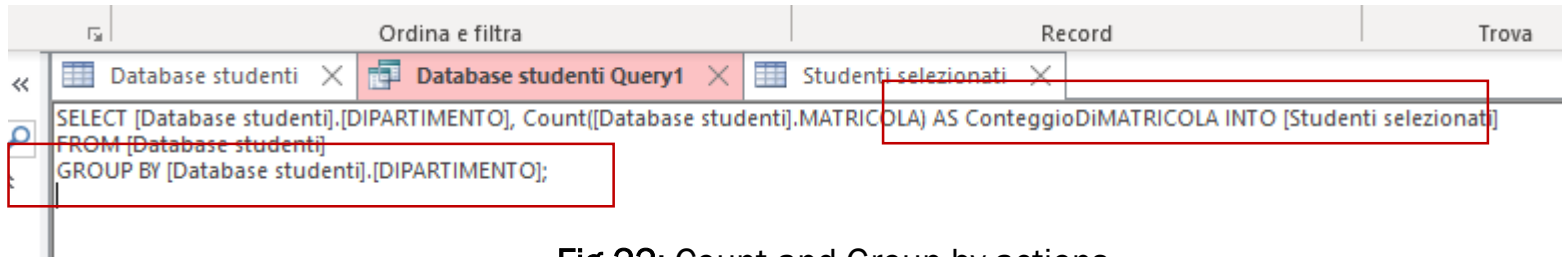
- Now, click on Run.
- The output of the query is the following:



DIPARTIMENTO	ConteggioDiMATRICOLA
ECONOMIA	112
GIURISPRUDENZA	133
INGEGNERIA	162
LETTERE	61
LINGUE	78
*	

Fig.21: Output of the query

- SQL visualization:



```
SELECT [Database studenti].[DIPARTIMENTO], Count([Database studenti].MATRICOLA) AS ConteggioDiMATRICOLA INTO [Studenti selezionati]
FROM [Database studenti]
GROUP BY [Database studenti].[DIPARTIMENTO];
```

Fig.22: Count and Group by actions

- You can also group in respect to two or more groups.



## QUEROES

### How to create a Simple Calculation query

- You have to calculate the number of students whose last name is “ROSSI” for each department.



Campo:	[DIPARTIMENTO]	COGNOME	MATRICOLA
Tabella:	Database studenti	Database studenti	Database studenti
Formula:	Raggruppamento	Dove	Conteggio
Ordinamento:			
Mostra:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Criteri:		"ROSSI"	
Oppure:			

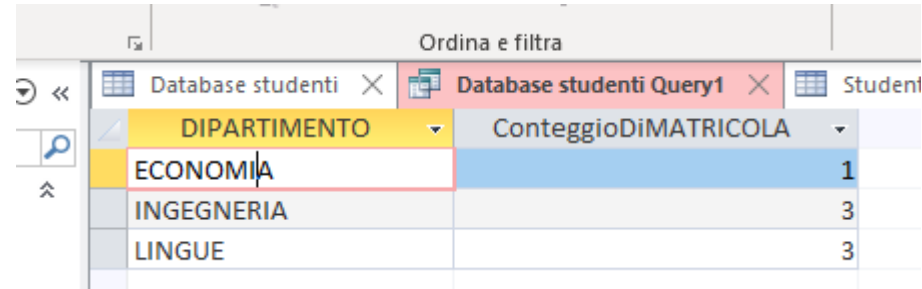
Fig.23: Count and Group by actions with a criterion

- Count on Freshman field.
- Group by on Department field.
- Criterion “ROSSI” on Last name field.

## QUEROES

### How to create a Simple Calculation query

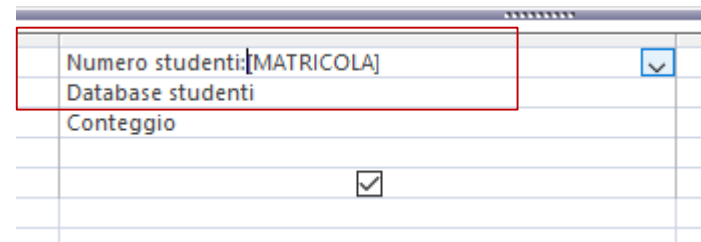
- The output of the query is the following:



DIPARTIMENTO	ConteggioDiMATRICOLA
ECONOMIA	1
INGEGNERIA	3
LINGUE	3

Fig.24: Output of the query

- You can change field name.
- To do this, you have to add, in the Field row, the name you want followed by `:[old name]`.



Field Name	Table Name
Numero studenti:[MATRICOLA]	Database studenti
Conteggio	

Fig.25: Field name change



# FURTHER MATERIAL

To review and deepen the topics of this lecture



1. [https://www.youtube.com/watch?v=uZ2C51n7TZs&list=PL4UezTfGBADCc5\\_0w-5DoDvwx9vbcNk0b&index=4&t=0s](https://www.youtube.com/watch?v=uZ2C51n7TZs&list=PL4UezTfGBADCc5_0w-5DoDvwx9vbcNk0b&index=4&t=0s)
2. [https://www.youtube.com/watch?v=LUL1nnxUz\\_c](https://www.youtube.com/watch?v=LUL1nnxUz_c)
3. <https://www.youtube.com/watch?v=HWCWL7S5KUs>
4. <https://www.youtube.com/watch?v=Wr0RI8X39yo>
5. Alexander, M., & Kusleika, R. (2018). Access 2019 Bible. John Wiley & Sons.