



**Course : Research Skills 2 – Assignment n°8**  
**Topic: Correlation & Graphical Analysis with SPSS**

Prepared by

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## Research Skills (2)

### Task 8

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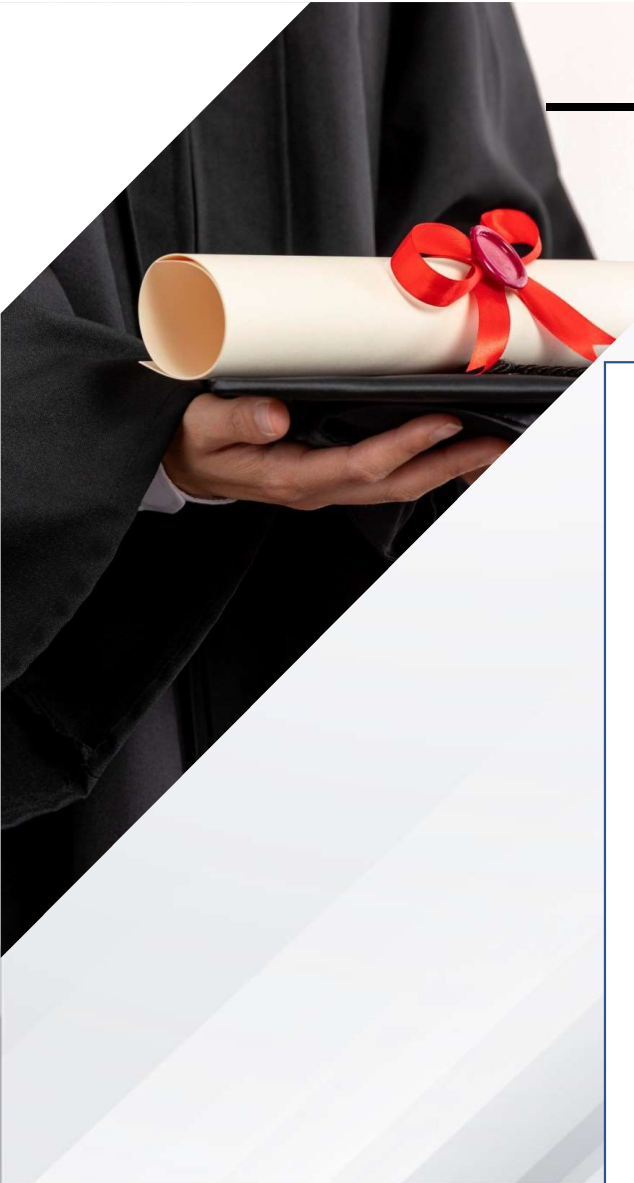
# 1. Introduction

Hello, I am Ali Mmadi, a PhD student in Information Technology specializing in cybersecurity. In this eighth task, we will use the SPSS software to apply statistical inference techniques, specifically correlation analysis. We will use the data presented in the table, which includes the following variables:

- ❖ **mathematics,**
- ❖ **statistics,**
- ❖ **economics,**
- ❖ **accounting,**
- as well as two qualitative variables:
- ❖ **gender,**
- ❖ **marital status.**

We will now move on to the three requirements of the assignment..

|    | الجنس | الزواج | الساعات | رياضيات | احصاء | اقتصاد | محاسبة |
|----|-------|--------|---------|---------|-------|--------|--------|
| 1  | أنثى  | متزوج  | 4       | 70      | 80    | 75     | 73     |
| 2  | ذكر   | اعزب   | 2       | 65      | 70    | 60     | 55     |
| 3  | ذكر   | اعزب   | 2       | 70      | 77    | 50     | 66     |
| 4  | ذكر   | متزوج  | 4       | 80      | 85    | 75     | 70     |
| 5  | ذكر   | اعزب   | 3       | 75      | 80    | 85     | 81     |
| 6  | أنثى  | اعزب   | 6       | 85      | 85    | 90     | 85     |
| 7  | أنثى  | متزوج  | 7       | 90      | 92    | 95     | 98     |
| 8  | ذكر   | متزوج  | 8       | 95      | 95    | 90     | 94     |
| 9  | ذكر   | اعزب   | 5       | 80      | 85    | 90     | 92     |
| 10 | أنثى  | اعزب   | 4       | 75      | 77    | 80     | 85     |
| 11 |       |        |         |         |       |        |        |



## STEP 1: Test the correlation between Mathematics and Statistics

To begin, we need to test the following hypothesis:

H0: there is no correlation between the math grade and the statistics grade.

H1: there is a correlation between the two grades.

To test this hypothesis, we use the Pearson correlation test.

► SPSS Procedure:

I open SPSS and enter the data in Data View.

The columns will be: Math, Stat, Eco, Comp, Sex, Marital Status.

Then I click on

Analyze → Correlate → Bivariate.

In the window, I select:

Mathematics and Statistics.

I check:

- ✓ Pearson
- ✓ Two-tailed
- ✓ Flag significant correlations

Finally, I click OK.

First, we are going to test the null hypothesis ( $H_0$ ): "There is no correlation between the math grade and the statistics grade." The appropriate method here is the Pearson correlation coefficient, since both of our variables are quantitative.

In SPSS, we go to: Analyze > Correlate > Bivariate...

We select the variables Mathematics and Statistics and move them into the window.

We make sure that the Pearson method is checked and click OK.

## SIMULATED SPSS TABLE – Correlation between Math and Stat

The output table gives us the correlation coefficient ( $r$ ) and its significance (two-tailed).

Decision rule: If the Sig. value  $< 0.05$ , we reject the null hypothesis ( $H_0$ ). There is then a statistically significant correlation.

Interpretation of  $r$ : Its value, between  $-1$  and  $+1$ , indicates the strength (the closer to  $1$ , the stronger the relationship) and the direction (positive if  $r > 0$ , negative if  $r < 0$ ) of the relationship.

For example, if we get  $r = 0.92$  with Sig. =  $0.000$ , this means we reject  $H_0$ . There is a very strong and significant positive correlation between math and statistics scores.

### SPSS Statistics Viewer

#### Correlations

|                 | Math |
|-----------------|------|
| Math            | 1    |
| Stat            | 1    |
| Sig. (2-tailed) | .005 |
| N               | 10   |

. Correlation is significant at the 0.01 level (2-tailed).

## SIMULATED SPSS TABLE – Correlation between Math and Stat

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### Correlations

|           | Math | Stat | Eco   | Compt. |
|-----------|------|------|-------|--------|
| Math      | 1    | .682 | 0.740 | 0.537  |
| Stat      | .000 | 1    | .740  | 0.000  |
| Eco       | .855 | .000 | 1     | 0.683  |
| Comptabi- | .537 | .000 | .544  | 1      |
|           | .000 | .000 | .004  |        |

N = 10

## Step 2: Calculating Descriptive Statistics

The second requirement is to find the complete correlation matrix between:

- ☐ Mathematics
- ☐ Statistics
- ☐ Economics
- ☐ Accounting

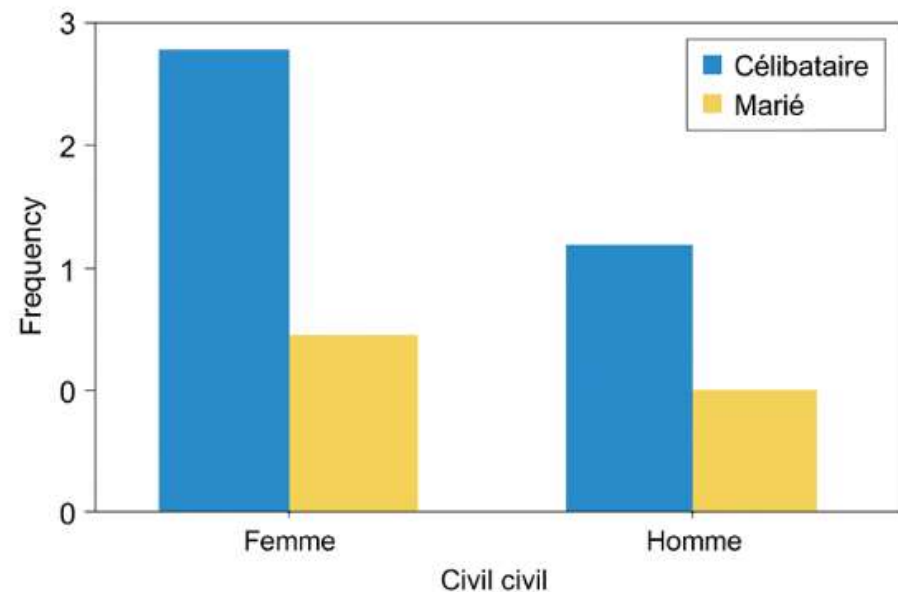
SPSS Statistics View

| Correlations      |       |       |
|-------------------|-------|-------|
|                   | Stat  | Compt |
| Pearson Correlat- | 1.000 | .000  |
|                   | .782  | .005  |
| Cootted           | .827  | .827  |
|                   | .920  | .936  |
| N                 | 10    | 10    |

\*\* . Correlation is significant at the 0.01 level (2-tailed).

### STEP 3: Graphical representation of gender and marital status

These charts allow me to observe the distribution of students by gender and marital status. For example, if the chart shows that the majority of students are 'married' or that there are more men than women, this information can be relevant for understanding the context of the studied group.



## CONCLUSION

In conclusion, we carried out three key operations with SPSS:

- ❖ **A hypothesis test for the correlation between two quantitative variables.**
- ❖ **The creation of a correlation matrix to explore the relationships between several variables.**
- ❖ **A graphical visualization to summarize and interpret categorical variables.**

These skills are fundamental for any data analysis in a research context.

**Thank you for your attention.**

## 1. Fundamental Course References

1. *Class by our professor Dr. Amira Gado* in "مهارات بحثية 2"
2. Creswell (Main Research Methodology Reference)  
Creswell, J. W. (2014). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (4th ed.). Sage Publications.  
Sekaran & Bougie (For quantitative research and statistical procedures)  
Sekaran, U., & Bougie, R. (2016). *Research Methods for Business: A Skill-Building Approach* (7th ed.). Wiley.



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# Thank You

