DataScience
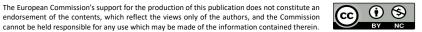in Human & Social Science for Women Empowerment

DATA SCIENCE COMPETENCE FRAMEWORK FOR HIGHER EDUCATION STUDENTS

Four areas of competence have been identified composed of **16** Key Competences, which develop **60** Learning Outcomes.
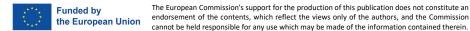
COMPETENCE AREA 1: HUMAN E SOCIAL COMPETENCES				
COMPETENCES	**LEARNING OUTCOMES & LEVEL OF CAPACITY**			
	BASIC Relying on the support of others (Discover, Explore)	**INTERMEDIATE** Building Independence (experiment, try, dare)	**ADVANCED** Take responsibility (improves, strengthens)	**EXPERT** Driving Innovation (expand, create)
1. EFFECTIVE COMMUNICATION	Explain what the meaning of data-based information is in business-related terms	Communicate information in a way that highlights the value of the action	Explain the research process and the hypotheses by which a conclusion was reached	
2. KNOWLEDGE OF THE SECTOR	I am able to understand the sector and its specific needs	I'm able to identify which problems in the sector need to be solved and why	I am able to transform data into valid results for the organization	
3. INTELLECTUAL CURIOSITY	I am able to orientate the search for answers	I'm able to think creatively with a willingness to learn more	I am able to go deeper than superficial results and initial assumptions	I keep asking myself why one answer is usually not enough

4. ETHICAL AND SUSTAINABLE THINKING	I can recognise behaviors that show integrity, honesty, responsibility, courage and commitment.	I am driven by honesty and integrity when taking decisions.	I can take responsibility for promoting ethical behavior in my area of influence	I take action against unethical behavior.
5. RESILIENCE	I show passion and willingness to achieve my goals.	I can overcome simple adverse circumstances.	I can persevere in the face of adversities when trying to achieve my goals.	I can cope with unexpected change, setbacks and failures

COMPETENCE AREA 2: THEORETICAL SKILLS OF DATA ANALYSIS				
COMPETENCES	**LEARNING OUTCOMES & LEVEL OF CAPACITY**			
	BASIC	**INTERMEDIATE**	**ADVANCED**	**EXPERT**
6. STATISTICAL MATHEMATICAL MODELS	I can demonstrate knowledge of descriptive statistical concepts (basic elements)	I can demonstrate knowledge of inferential statistics	I can demonstrate knowledge in linear models	I can demonstrate Knowledge of Multilevel models
7. PROBABILITY THEORY	I can follow calculations in probability, and know what the basic definitions mean (independent variables, conditional probability)	I can independently make calculations involving probability and conditionals. I can compute expected values, and am familiar with Bayes' Theorem.	Probability density functions don't scare me. I know PDFs of the most important discrete and continuous random variables, and am able to use them in the right situations.	I am fluent in marginal and conditional distributions, even when applied to random vectors.
8. LINEAR ALGEBRA AND CALCULUS	I understand matrix notation, and can perform simple matrix operations	I know what symmetric matrices are. I can compute the matrix	I can compute eigenvalues, and diagonalize matrices. Matrix calculus is my game. I	I can perform singular value decompositions in my sleep. Or any other

	such as addition, multiplication, transpose, inversion.	determinant, and determine the null space and the range of a matrix.	can easily compute Gradients and Hessians of linear and quadratic functions.	kind of matrix decomposition, as appropriate.

COMPETENCE AREA 3: TECHNICAL SKILLS				
COMPETENCES	**LEARNING OUTCOMES & LEVEL OF CAPACITY**			
	BASIC	**INTERMEDIATE**	**ADVANCED**	**EXPERT**
9. DATA WRANGLING (Or Cleaning)	I am able to collect, select with support I'm able to Merge multiple data sources into a single dataset for analysis	I am able to identify gaps in data (for example, empty cells in a spreadsheet) and either fill them in, or delete them	I am able to collect, select, restructure, enrich and finally transform information with the aim of answering a specific question	I am able to validate data . Data validation helps to highlight potential quality problems so that they can be addressed and transformed if necessary.
10. VISUALIZATION	I can create simple scatter and bar plots in a language of my choice (R, Python).	I can create more sophisticated plots, rearrange order of variables, add legends and adapt axis labeling and tick marks.	I can create interactive visual displays.	I am able to independently determine the most informative way to display quantitative information, in order to enhance understanding.
11. CODING	I can write basic pieces of code required to conduct data analysis	I can write a script file to perform multi-stage data analysis	I can write a script file to perform multi-stage data analysis in the most efficient way, minimizing complexity and length	I can expand and improve currently available code in order to accommodate new theoretical developments

12. SOFTWARE	I'm able to Implement descriptive and inferential statistics using excel and R studio.	I can extract valuable information from an organized data set from the most popular data analyst tools (R studio, R, Python, Jamovi and other Data science software)	I'm able to use advanced software code to test hypothesis, calculate correlations and to predict a continuous variable using regression, Validate regression assumptions etc	I can identify and make use of the most efficient code for data analysis, depending on the specific problem to be studied

COMPETENCE AREA 4: NON-TECHNICAL SKILLS

COMPETENCES	LEARNING OUTCOMES & LEVEL OF CAPACITY			
	BASIC	INTERMEDIATE	ADVANCED	EXPERT
13. CRITICAL THINKING	I am capable of analyzing questions, hypotheses and results objectively	I am able to understand what resources are crucial to solve a problem	I'm able to look at problems from different points of view and perspectives	
14. PROBLEM SOLVING	I'm able to Identify opportunities and explaining problems and solutions	I am able to address problems by identifying existing assumptions and resources	I am able to examine and find the most effective methods to get the right answers	

15. CREATIVITY	Alone and as part of a team, I can develop ideas that create value for others.	I can experiment with different techniques to generate alternative solutions to problems, using available resources in an effective way.	I can describe different techniques to test innovative ideas with end users.	I can design new processes to involve stakeholders in generating, developing and testing ideas that create value.
16. LEADERSHIP AND PROFESSIONAL DEVELOPMENT	I am a good problem solver. I can define a problem; determine the cause of the problem; identify, prioritizing, and selecting alternatives for a solution; and implementing a solution.	I can understand the opportunity before implementing the solution, work in a rigorous and complete manner and explain their findings	I need to understand the concepts of analyzing business risks	I can make improvementsin processes and how systems engineering works