SYLLABUS

Quantitative research methods and data analysis

University year 2025 - 2026

1. Information regarding the programme

| 1.1. Higher education institution | Babeș-Bolyai University |
|------------------------------------|--|
| 1.2. Faculty | Faculty of Psychology and Educational Sciences |
| 1.3. Department | Department of Psychology / Department of Clinical Psychology |
| 1.4. Field of study | Psychology - Cognitive Sciences |
| 1.5. Study cycle | Bachelor level |
| 1.6. Study programme/Qualification | Psychologist |
| 1.7. Form of education | Full time |

2. Information regarding the discipline

| 2.1. Name of the dise | ciplin | e Quantitati | Quantitative research methods and data analysis | | | | Discipline code | PLE1103 |
|--------------------------|--------|---------------|---|--|------------|-----------------------|-----------------|-----------|
| 2.2. Course coordinator | | | | Assistant Professor Ionuț-Stelian Florean, Ph.D. | | | | |
| 2.3. Seminar coordinator | | | | Assistan | t Professo | or Ionuț-Stelian Flor | ean, Ph.D. | |
| 2.4. Year of study | 1 | 2.5. Semester | 2.5. Semester 1 2.6. Type of evaluation | | | 2.7. Dis | scipline regime | Mandatory |

3. Total estimated time (hours/semester of didactic activities)

| 3.1. Hours per week | 4 | of which: 3.2 course | 4 | 3.3 seminar/laboratory | 2 |
|---|------------|--------------------------|----------|------------------------|----|
| 3.4. Total hours in the curriculum | 56 | of which: 3.5 course | 28 | 3.6 seminar/laborator | 28 |
| Time allotment for individual study (ID) and self-study activities (SA) | | | | | |
| Learning using manual, course support, bibliography, course notes (SA) | | | | | |
| Additional documentation (in libraries, on | electronic | platforms, field documer | ntation) | | 24 |
| Preparation for seminars/labs, homework, papers, portfolios and essays: | | | | | 10 |
| Tutorship | | | | | |
| Evaluations | | | | | |
| Other activities: | | | | | |
| 3.7. Total individual study hours 70 | | | | | |
| 3.8. Total hours per semester 128 | | | | | |
| 3.9. Number of ECTS credits 5 | | | | | |

4. Prerequisites (if necessary)

| 4.1. curriculum | Basic knowledge of research methods in psychology (Quantitative research methods and data analysis I) |
|-------------------|---|
| 4.2. competencies | English language |

5. Conditions (if necessary)

| 5.2. for the seminar /lab activities • Room with at least 30 seats, computer and video projector / Online seminar conducted through the MS Teams platform; computers with data analysis software Excel and JASP. | 5.1. for the course | • Classroom with at least 60 seats, computer and video projector / Online course conducted through the MS Teams platform. |
|--|--------------------------------------|---|
| | 5.2. for the seminar /lab activities | • Room with at least 30 seats, computer and video projector / Online seminar conducted through the MS Teams platform; computers with data analysis software Excel and JASP. |

6.1. Specific competencies acquired ¹

¹ One can choose either competences or learning outcomes, or both. If only one option is chosen, the row related to the other option will be deleted, and the kept one will be numbered 6.

| | • Knowledge of descriptive and correlational/predictive research designs (design, selection of participants and data collection). |
|-------------------------|--|
| a | • Knowledge of univariate and bivariate descriptive statistical indicators (design, selection of participants and data collection). |
| s | • Explain the advantages and disadvantages of the most important descriptive/correlational research methods. |
| al/esse tencie | • Conduct an observational research study (behaviour sampling, participants sampling, observational data collection and data analysis). |
| on: | • Conduct a survey research study (participants sampling, survey data collection and data analysis). |
| ofessi com | • Conduct a correlational/predictive research study (participants sampling, survey data collection and data analysis). |
| Pr | Read and evaluate scientific research reports involving descriptive and correlational/predictive studies in cognitive science. |
| | • Promotes scientific rigor in the design, execution, collection, processing, and interpretation of research data. |
| | • Shows interest in scientific research in the field of cognitive sciences. |
| ansversal mpetencies | Mathematical competence and competence in science. Digital competence. Personal, social, and learning to learn competence. |
| Tr | • Carrying out complex professional tasks under circumstances of professional autonomy and independence. |

6.2. Learning outcomes

| olat Lean | |
|-----------|--|
| | 1. The fundamental principles of descriptive and correlational/predictive research designs , including how to design studies, salest participants, and collect data appropriately. |
| | design studies, select participants, and concet data appropriately. |
| | 2. The main types of descriptive statistical indicators (univariate and bivariate) and their applications in analyzing |
| e | behavioral and cognitive data. |
| Knowledg | 3. The advantages and limitations of key research methods used in cognitive science, such as observational, survey, and correlational approaches. |
| | 4. The structure and content of scientific research reports in the field, and how to interpret findings with a critical and informed perspective. |
| | 5. The principles of scientific rigor and ethical research conduct , particularly in the context of data collection, processing, and interpretation. |
| | 1. Design and conduct descriptive, observational, survey, and correlational/predictive research studies, including participant sampling, data collection, and appropriate analysis. |
| | 2. Apply univariate and bivariate descriptive statistical techniques to summarize and interpret research data in cognitive science. |
| Skills | 3. Critically evaluate scientific research reports , identifying methodological strengths, limitations, and the validity of conclusions. |
| | 4. Use digital tools and statistical software to collect, process, and analyze behavioral and cognitive data accurately. |
| | 5. Communicate research findings clearly and adapt research methods to diverse scientific questions and contexts in cognitive science. |

| | 1. Plan and carry out complex research tasks autonomously, using appropriate methods and tools for data collection and analysis. |
|------------------|---|
| ility omy: | 2. Demonstrate initiative and responsibility in conducting ethical and scientifically rigorous research. |
| oonsib autone | 3. Reflect critically on their own learning and research practice, and adapt based on feedback or new insights. |
| Resp and a | 4. Integrate personal, social, and learning-to-learn competences in managing cognitive science projects. |
| | 5. Apply scientific and digital competences independently in diverse research contexts and problem-solving situations. |

7. Objectives of the discipline (outcome of the acquired competencies)

| 7.1 General objective of the discipline | The course intends to familiarize the students with the main quantitative descriptive and correlational research methods in cognitive sciences. |
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| 7.2 Specific objective of the discipline | The course intends to present the core techniques of quantitative approaches involved in analyzing social phenomena. A special emphasis will be placed in developing the basic skills for using statistical software. |

8. Content

| 8.1 Course | Teaching methods | Remarks |
|---|--|---------|
| 1. Introductory course. Description of the course objectives, its content and evaluation criteria. | Presentation, discussion. | |
| 2. Introduction to research in cognitive sciences: scientific knowledge and scientific facts (data) Research paradigms in cognitive sciences. | Presentation, discussion, problem solving. | |
| 3. Measurement in cognitive sciences. Manifest and latent variable in cognitive sciences. | Presentation, discussion, case studies, exercises. | |
| 4. Descriptive observational study. Scientific observation vs. unscientific observation. | Presentation, discussion, case studies, exercises. | |
| 5. Descriptive survey study. Sample and population. Participants selection strategies in descriptive studies. Introduction of the concept of probability. Probabilistic and non-probabilistic sampling. | Presentation, explanation, demonstration, exemplification, dialogue, debate. | |
| 6. Frequency distributions. Graphic representation of frequency distributions. Univariate descriptive statistics. | Presentation, discussion, case studies, exercises. | |
| 7. z transformation. Standardized scores. Normal distribution. Standardized normal distribution. | Presentation, discussion, case studies, exercises. | |
| 8. Correlational descriptive study. Correlation and causality. Advantages and limitations of correlational study. Bivariate descriptive statistics. | Presentation, discussion, case studies, exercises. | |
| 9. Correlational-predictive study. Simple regression analysis. | Presentation, explanation, demonstration, exemplification, dialogue, debate. | |
| 10. Correlational-predictive study. Multiple regression analysis. | Presentation, discussion, studies, exercises. | |
| 11. Sampling distribution. The problem of estimating a population parameter using a randomly selected sample. | Presentation, discussion, case studies, exercises. | |
| 12. Estimating confidence interval for the population mean. | Presentation, discussion, case studies, exercises. | |
| 13. Estimating confidence interval for the population correlation and/or regression coefficients. | Presentation, explanation, demonstration, exemplification, dialogue, debate. | |

| 14. Summary course. Descriptive/correlational/ | Presentation, discussion, case | |
|---|--------------------------------|--|
| predictive research in the field of cognitive | | |
| sciences. | | |
| Advantages and limitations of descriptive | studies, exercises. | |
| research. Analysis of published research reports. | | |
| Bibliography | | |

- Anderson, N. (2007) Empirical direction in design and analysis. Mahwah, NJ: Erlbaum.
- Cohen, B. (2001) Explaining psychological statistics. John Wiley & Sons, New York.
- Gravetter, F. J., Wallnau, L. B., Forzano, L. A. B., & Witnauer, J. E. (2021). Essentials of statistics for the behavioral sciences. Cengage Learning.
- Leary, M. (2001) Introduction to Behavioral Research Methods. Allyn & Bacon, Boston
- Shaughnessy, J. J. Zechmeister, E. B. & Zechmeister, J. (2012). Research methods in psychology. NY: McGraw Hill

| 8.2 Seminar / laboratory | Teaching methods | Remarks |
|---|---|---------|
| 1. Introductory course. Description of the course objectives, its content and evaluation criteria. | Presentation, discussion. | |
| 2. Introduction to research in cognitive sciences: science and pseudoscience. | Case studies and applications. Demonstration, exemplification, data analysis. | |
| 3. Measurement in cognitive sciences. Measurement scales. | Case studies and applications. Explanation, demonstration, dialogue exemplification. Computer assisted data analysis based real or simulated data sets. | |
| 4. Descriptive observational study. Computing interrater reliability. | Computer assisted data analysis based real or simulated data sets. | |
| 5. Descriptive survey study. <i>Sampling. Survey</i> questionnaire construction. | Explanation, demonstration, dialogue exemplification. Computer assisted data analysis based real or simulated data sets. | |
| 6. Computing univariate descriptive statistics using R. | Case studies and applications. Explanation, demonstration, dialogue exemplification. Computer assisted data analysis based real or simulated data sets. | |
| 7. Using z transformation to answer important research questions: statistical standardization using R. | Case studies and applications. Simulation in supporting scientific papers. Computer assisted data analysis based real or simulated data sets. | |
| 8. Correlational descriptive study. Estimating bivariate descriptive statistics using R. | Case studies and applications. Explanation, demonstration, dialogue exemplification. Computer assisted data analysis based real or simulated data sets. | |
| 9. Correlational-predictive study. Estimating regression parameters (intercept and slope) using R. | Case studies and applications. Explanation, demonstration, dialogue exemplification. Computer assisted data analysis based real or simulated data sets. | |
| 10. Correlational-predictive study. Estimating regression parameters (intercept and multiple slopes) using R. | Case studies and applications. Explanation, demonstration, dialogue exemplification. Computer assisted data analysis based real or simulated data sets. | |
| 11. Estimating a population parameter using a randomly selected sample using R. | Case studies and applications. Explanation, demonstration, dialogue exemplification. Computer assisted data analysis based real or simulated data sets. | |
| 12. Estimating confidence interval for the population mean using R. | Case studies and applications. Explanation, demonstration, | |

| | dialogue exemplification. Computer | |
|---|--------------------------------------|--|
| | assisted data analysis based real or | |
| | simulated data sets. | |
| | Case studies and applications. | |
| 13. Estimating confidence interval for the for the | Explanation, demonstration, | |
| population correlation and/or regression | dialogue exemplification. Computer | |
| coefficients using R. | assisted data analysis based real or | |
| | simulated data sets. | |
| | Case studies and applications. | |
| 14. JASP application for descriptive univariate and bivariate date R. | Explanation, demonstration, | |
| | dialogue exemplification. Computer | |
| | assisted data analysis based real or | |
| | simulated data sets. | |
| Bibliography | | |

9. Corroborating the content of the discipline with the expectations of the epistemic community, professional associations and representative employers within the field of the program

The course covers typical topics taught in introductory research methods and data analysis at similar study programs, from the country and abroad; It is adapted to current knowledge in the field; The subjects taught are useful for professionals and researchers applying quantitative methods in cognitive sciences.

10. Evaluation

| Activity type | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percentage of final grade |
|----------------------------|---|--|--------------------------------|
| 10.4 Course | Correct, logical and coherent application of the concepts learned. Logical and accurate explanation and interpretation of the results. | Final Exam: multiple-choice questions and written answers | 60% |
| 10.5 Seminar/laboratory | Project | The project will be presented at the end of the semester during the seminar and will focus on applying the analyses learned. | 40% |
| | Attendance | To be eligible for the exam during the main session, a student must attend at least 70% of the seminars. Those who do not meet this requirement can take the exam in the retake session. | |
| 10.6 Minimum standard of r | performance | | |

The students should prove that acquired the concepts, notions and tools of descriptive/correlational research and data analysis above a minimal accepted level. The students should prove that have the ability to apply this knowledge to practical problems and real life situations, above a minimal accepted level (minimum grade of 5).

11. Labels ODD (Sustainable Development Goals)²

| | General labe | l for Sustainabl | e Developmen | t | | | |
|--|-----------------------|---------------------------------|------------------------|----------------------|---|--------------------------------------|---|
| 1 [№] ₱vyerty ⋔ * कै * ⋔ | | 3 GOOD HEALTH AND WELL-BEING | 4 QUALITY EDUCATION | 5 GENDER EQUALITY | | 8 DECENT WORK AND ECONOMIC GROWTH | 9 ADUSTRY, INNOVATION AND INFRASTRUCTURE |
| 10 REDUCED INEQUALITIES | 11 SUSTAINABLE CITIES | | | | 16 PEACE, JUSTICE AND STRONG INSTITUTIONS | 17 PARTNERSHIPS FOR THE GOALS | |

| Date: 20.03.2025 | Signature of course coordinator | Signature of seminar coordinator | | |
|------------------|--|--|--|--|
| | Assistant Professor Ionuț-Stelian Florean, | Assistant Professor Ionuț-Stelian Florean, | | |
| | Ph.D. | Ph.D. | | |

Date of approval:

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Signature of the head of department

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² Keep only the labels that, according to the *Procedure for applying ODD labels in the academic process*, suit the discipline and delete the others, including the general one for *Sustainable Development* – if not applicable. If no label describes the discipline, delete them all and write *"Not applicable."*.