Course unit English denomination	**BASICS OF STATISTICAL INFERENCE AND LINEAR MODELS WITH R**
SS	PSIC-01/C
Teacher in charge (if defined)	UMBERTO GRANZIOL
Teaching Hours	20
Number of ECTS credits allocated	4
Course period	1st (25/26)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☒ Yes (70% minimum of presence) ☐ No
Course unit contents	Statistical inference does not involve only the ability to read a p-value. It requires knowledge of what is being analyzed and how to program it properly. This course is designed to provide doctoral students with a comprehensive understanding of statistical inference by actively engaging them in practical exercises. It places a strong emphasis on how to find solutions to specific problems through the application of the R programming language. Furthermore, this course will enhance students' computational proficiency in the field of data science, covering key topics such as probability calculus, estimation, inference, and planned comparisons within the context of linear models.
Learning goals	1) Critical thinking for solving some statistical issues 2) Implementation of the R code for these solutions
Teaching methods	METHODOLOGY
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	BASICS OF R FOR DATA SCIENCE

Examination methods (if applicable)	Not applicable
Suggested readings	All suggested readings will be available on the dedicated Moodle page
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**BASICS OF R FOR DATA SCIENCE**
SS	PSIC-01/A
Teacher in charge (if defined)	ENRICO TOFFALINI
Teaching Hours	10
Number of ECTS credits allocated	2
Course period	1st (25/26)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☒ Yes (70% minimum of presence) ☐ No
Course unit contents	R is an open-source programming languages used for statistical analysis and data science, that has rapidly become among the most used in academic settings. This course serves as a foundational introduction to the R language that lays the ground for many subsequent courses specialized on statistical analysis within this PhD program. Participants will gain proficiency in fundamental operations on data structures, including vectors, data frames, and lists. They will learn to import and export data, understand various data types. They will master basic concepts of programming such as performing iterations and loops, defining conditional statements, and defining custom functions. Moreover, students will be introduced to commonly used R packages for statistical analysis in social sciences.
Learning goals	1) Proficiency in essential operations on data structures, including vectors, data frames, and lists. 2) Fundamental programming concepts such as iterations, loops, conditional statements, and custom function definitions. 3) Introduction to commonly used R packages for data science and statistical analysis in social sciences.
Teaching methods	PROGRAMMING
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No

Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	
Examination methods (if applicable)	Not applicable
Suggested readings page	All suggested readings will be available on the dedicated Moodle
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**PSYCHOLOGICAL MEASUREMENT**
SS	PSIC-01/C
Teacher in charge (if defined)	LUCA STEFANUTTI
Teaching Hours	15
Number of ECTS credits allocated	3
Course period	1st (25/26)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☒ Yes (70% minimum of presence) ☐ No
Course unit contents	The course is about measurement, both in general, across disciplines and in the special case of psychology. Naive psychological measurement is still in use, almost oblivion of the existence of a mathematical theory, named representational measurement theory (RMT), which offers a rigorous and comprehensive framework for measurement, valid for any empirical science. Extensive measurement (measurement in the physical sense) can only occur if a well specified set of conditions, known as the Hölder's conditions, hold true empirically. Such conditions do not hold with psychological attributes like intelligence, motivation, anxiety, emotional feelings, etc. Several alternatives to extensive measurement are offered by the RMT framework. Some of the most important for psychology (like ordinal measurement and conjoint measurement) are illustrated, both theoretically and in practice, with the help of examples taken from experimental, clinical, and social psychology.
Learning goals	1) Recognize and avoid the typical and pervasive biases of naive measurement 2) Establish artifact-independent (thus, meaningful) measurements 3) Apply various types of ordinal measurement to your data 4) Carry out a conjoint measurement study
Teaching methods	METHODOLOGY
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No

Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	
Examination methods (if applicable)	Not applicable
Suggested readings page	All suggested readings will be available on the dedicated Moodle
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**CURRENT ISSUES IN STATISTICAL INFERENCE FOR PSYCHOLOGY**
SS	PSIC-01/C
Teacher in charge (if defined)	MASSIMILIANO PASTORE
Teaching Hours	10
Number of ECTS credits allocated	2
Course period	2nd (25/26)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☒ Yes (70% minimum of presence) ☐ No
Course unit contents	The course is organized into four parts. It begins by addressing the primary challenges associated with statistical analysis in psychology, with a specific focus on the difficulties in using and interpreting statistical significance. The third part discusses both the replicability crisis and the reproducibility crisis. Finally, it presents new strategies for enhancing the quality of psychological research.
Learning goals	1) Enhancing the awareness of best practices in psychological research 2) Understanding the history of the replicability crisis and its ongoing consequences 3) Acquiring knowledge about current research practices related to open data and reproducibility
Teaching methods	METHODOLOGY
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	

Examination methods (if applicable)	Not applicable
Suggested readings	All suggested readings will be available on the dedicated Moodle page
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**POWER AND DESIGN ANALYSIS**
SS	PSIC-01/C
Teacher in charge (if defined)	GIANMARCO ALTOÈ
Teaching Hours	5
Number of ECTS credits allocated	1
Course period	2nd (25/26)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☒ Yes (70% minimum of presence) ☐ No
Course unit contents	Power analysis is a fundamental statistical method for planning the sample size of a study. Its importance has recently been highlighted in addressing the replicability crisis in psychological research. This course aims to explain the theoretical foundations of power analysis and provide practical tools using the R software. Additionally, both the theoretical and practical aspects of design analysis, which can be seen as a useful extension of power analysis, will be discussed.
Learning goals	1) When and how to plan the sample size of a study 2) How to evaluate the results of a study taking into account several inferential risks 3) Implement power and design analysis using the R software
Teaching methods	METHODOLOGY
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	BASICS OF STATISTICAL INFERENCE AND LINEAR MODELS WITH R
Examination methods	Not applicable

(if applicable)	
Suggested readings page	All suggested readings will be available on the dedicated Moodle
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**EVALUATION OF OUTLIERS AND INFLUENTIAL CASES IN MULTIVARIATE PERSPECTIVE**
SS	PSIC-01/C
Teacher in charge (if defined)	GIANMARCO ALTOÈ
Teaching Hours	5
Number of ECTS credits allocated	1
Course period	2nd (25/26)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☐ Yes ☒ No
Course unit contents	Outliers (i.e., single observations that are distant from the others based on the variables of interest) and influential cases (i.e., single observations with a huge impact on the estimated parameters of a model) are ubiquitous in statistical analyses in psychology. In this course, based on practical examples, we will see how to define, identify, and handle univariate and multivariate outliers as well as influential cases. On a practical level, various statistical methods will be presented using the R software. These methods can easily be extended to other statistical software as well.
Learning goals	1) Evaluate the presence of outliers and influential cases in a statistical analyses 2) Handle outliers and influential cases appropriately 3) Implement the various methods learned using the R software
Teaching methods	METHODOLOGY
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	

Examination methods (if applicable)	Not applicable
Suggested readings page	All suggested readings will be available on the dedicated Moodle
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**QUESTIONABLE MEASUREMENT PRACTICES AND HOW TO AVOID THEM**
SS	PSIC-01/C
Teacher in charge (if defined)	TATIANA MARCI
Teaching Hours	5
Number of ECTS credits allocated	1
Course period	2nd (25/26)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☒ Yes (70% minimum of presence) ☐ No
Course unit contents	Although questionable measurement practices (QMPs) are common in psychological research and pose a potential threat to the validity of a study's conclusions, they have been largely neglected in the literature. In this course we will define QMPs, analyse examples of QMPs in the psychological literature, and highlight a series of questions that researchers can consider to identify and avoid them. We will discuss how measurement practices can be improved, and how transparency in measurement practices promotes rigorous research, allows careful evaluation of study conclusions, and is necessary for sound replication studies.
Learning goals	1) Assess the degree of validity of a psychological instrument 2) Identify and avoid questionable measurement practices
Teaching methods	METHODOLOGY
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	PSYCHOLOGICAL MEASUREMENT

Examination methods (if applicable)	Not applicable
Suggested readings page	All suggested readings will be available on the dedicated Moodle
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**DATA VISUALISATION WITH GGPLOT2**
SS	PSIC-01/C
Teacher in charge (if defined)	MICHELE VICOVARO
Teaching Hours	5
Number of ECTS credits allocated	1
Course period	2nd (25/26)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☐ Yes ☒ No
Course unit contents	Proficiency in performing statistical analyses with R is a crucial skill for researchers in behavioral sciences. This skill should be complemented by the ability to construct informative and visually appealing graphs, as graphs are increasingly important for transparent and effective communication of scientific study findings. The ggplot2 package serves as a potent and adaptable tool within the R environment, facilitating the creation of meaningful and aesthetically pleasing graphs. Although its logic may initially appear complex, once you grasp the fundamentals, you will appreciate the high degree of control it offers over the graphs that you are planning to create for your forthcoming research papers.
Learning goals	1) Evaluation of the strengths and weaknesses of different graphical representations 2) Mastery of the ggplot2 programming language basics 3) Proficiency in crafting various types of graphs using ggplot2.
Teaching methods	METHODOLOGY
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	BASICS OF R FOR DATA SCIENCE

Examination methods (if applicable)	Not applicable
Suggested readings page	All suggested readings will be available on the dedicated Moodle
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**CRAFTING EFFECTIVE SCIENTIFIC PRESENTATIONS**
SS	PSIC-01/C
Teacher in charge (if defined)	FILIPPO GAMBAROTA
Teaching Hours	5
Number of ECTS credits allocated	1
Course period	2nd (25/26)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☐ Yes ☒ No
Course unit contents	Creating engaging and effective scientific presentations is a crucial skill for researchers This course is designed to guide on creating impactful scientific presentations tailored to various contexts. We will see how to organize a scientific presentation considering time constraints, type of audience (colleagues, students, general audience, etc.), and type of event (conference, lab meeting, thesis defense, etc.). We will see how to create the presentation practically with suggestions on slides organization, visual style, and how to include graphical elements (figures, diagrams, etc.). Finally, there will be suggestions on how to present effectively in terms of rhythm and voice tone.
Learning goals	1) Organizing a scientific presentation according to the specific aim and audience 2) Creating the presentation practically with common software 3) Doing the talk effectively
Teaching methods	SOFT SKILLS
Course on transversal, interdisciplinary, transdisciplinary skills	☒ Yes ☐ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	

Examination methods (if applicable)	Not applicable
Suggested readings page	All suggested readings will be available on the dedicated Moodle
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**BASICS OF MATLAB FOR DATA SCIENCE**
SS	PSIC-01/C
Teacher in charge (if defined)	LUCA STEFANUTTI
Teaching Hours	10
Number of ECTS credits allocated	2
Course period	2nd (25/26)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☐ Yes ☒ No
Course unit contents	Like Python, R, and still other languages, MATLAB is a high level scientific programming language that inherits the power of the C language, still remaining much simpler in its structure. The course introduces the student to the logic of “solving problems by programming” through the MATLAB programming language. Procedural programming mostly consists of applying algorithms to data structures. Basic data structures (like vectors, matrices, strings and lists) and fundamental algorithms (the pieces of code that “do the things”) are illustrated in theory and through a series of practical examples. In a later step, algorithms and data structures are applied within the most important abstraction mechanism of the whole procedural programming framework, namely functions.
Learning goals	1) Using MATLAB on-line from virtually any device 2) Elementary programming skills for data analysis, text and string manipulation 3) Code debugging and testing 4) Managing large and complex data structures through vectors and matrices 5) Develop your own MATLAB functions
Teaching methods	PROGRAMMING
Course on transversal, interdisciplinary, transdisciplinary skills	☒ Yes ☐ No

Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	
Examination methods (if applicable)	Not applicable
Suggested readings page	All suggested readings will be available on the dedicated Moodle
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**BASICS OF PYTHON FOR DATA SCIENCE**
SS	PSIC-01/A
Teacher in charge (if defined)	ENRICO TOFFALINI
Teaching Hours	10
Number of ECTS credits allocated	2
Course period	2nd (25/26)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☐ Yes ☒ No
Course unit contents	Python is an open-source programming language that has emerged as a global leader in data science applications, particularly within industry contexts. This course aims to equip students with fundamental skills in using Python for data science. Participants will learn foundational concepts such as data manipulation, and basics of statistical modelling using Python's extensive ecosystem of powerful libraries, including NumPy, Pandas, Matplotlib, and Scikit-learn. Mainly through hands-on exercises, participants will get the basic skills for real-world data analysis, including data cleaning, visualization, and a bit of machine learning. By the end of the course, students will not only be able to translate familiar processes from R to Python but also gain insights into the expanded capabilities offered by Python.
Learning goals	1) Proficiency in fundamental data structure operations, encompassing data frames and lists, alongside mastering essential programming concepts like iterations and conditional statements (already mastered in R), now applied within the Python environment 2) Basics of machine learning and statistical analysis performed in Python 3) Knowledge of commonly used Python libraries for data science
Teaching methods	PROGRAMMING
Course on transversal, interdisciplinary, transdisciplinary skills	☒ Yes ☐ No

Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	
Examination methods (if applicable)	Not applicable
Suggested readings page	All suggested readings will be available on the dedicated Moodle
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**METHODOLOGY IN NEUROSCIENCES**
SS	PSIC-01/A
Teacher in charge (if defined)	SIMONE CUTINI
Teaching Hours	10
Number of ECTS credits allocated	2
Course period	1st (26/27 - 27/28)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☐ Yes ☒ No
Course unit contents	Methodological issues are fundamental aspects that need to be taken into account in every phase of the experiment, starting from its planning up to the analysis of the data collected. In this course, we will study the most important methodological practices that must be performed in each phase. We will also see some of the most common and dangerous pitfalls that need to be avoided. We will tackle some topics in cognitive psychology, cognitive neuroscience that will be used as examples that can be applied in other research fields, together few statistical issues which all should be aware of.
Learning goals	1) How to plan and perform an experiment (including how to select the best experiment for your needs) 2) Use some tip and tricks to improve experiments and analyses 3) How to avoid common mistakes and bad practice
Teaching methods	METHODOLOGY
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	

Examination methods (if applicable)	Not applicable
Suggested readings page	All suggested readings will be available on the dedicated Moodle
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**BAYESIAN DATA ANALYSIS IN PSYCHOLOGICAL RESEARCH**
SS	PSIC-01/C
Teacher in charge (if defined)	MASSIMILIANO PASTORE
Teaching Hours	10
Number of ECTS credits allocated	2
Course period	1st (26/27 - 27/28)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☐ Yes ☒ No
Course unit contents	The objective of the course is to introduce the Bayesian approach in practical terms. It comprises three parts: 1) an introduction to probability, 2) the binomial model, and 3) the normal model. In the practical component, we will provide an overview of STAN along with examples demonstrating its application within the R environment.
Learning goals	1) The rationale for the Bayesian approach 2) Basics of using STAN
Teaching methods	METHODOLOGY
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	
Examination methods (if applicable)	Not applicable
Suggested readings	All suggested readings will be available on the dedicated Moodle page

Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**GENERALISED LINEAR MODELS**
SS	PSIC-01/C
Teacher in charge (if defined)	FILIPPO GAMBAROTA
Teaching Hours	15
Number of ECTS credits allocated	3
Course period	1st (26/27 - 27/28)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☐ Yes ☒ No
Course unit contents	Generalized linear models (GLMs) are generalizations of ordinary linear regression where the data are assumed to be not normally distributed. In psychology, it is common to have categorical (e.g., binary) or strictly positive (e.g., counts or reaction times) variables that require appropriate models. In this course, we will see how GLMs are defined and formalized from a statistical point of view. Then we will implement the model in R with a particular focus on parameter interpretation. Moreover, we will implement Monte Carlo simulations to better understand the data generation process and estimate statistical properties (e.g., type-1 error and power).
Learning goals	1) Understand the statistical theory of GLMs 2) Fit and interpret a GLM using R 3) Implement Monte Carlo simulations for the most common GLMs
Teaching methods	METHODOLOGY
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	BASICS OF STATISTICAL INFERENCE AND LINEAR MODELS WITH R

Examination methods (if applicable)	Not applicable
Suggested readings page	All suggested readings will be available on the dedicated Moodle
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**STRUCTURAL EQUATION MODELING**
SS	PSIC-01/A
Teacher in charge (if defined)	TOMMASO FERACO
Teaching Hours	20
Number of ECTS credits allocated	4
Course period	1st (26/27 - 27/28)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☐ Yes ☒ No
Course unit contents	Structural equation modeling (SEM) is a powerful statistical technique that enables the analysis of multivariate data and latent variables. In this course, we will delve into the theoretical and statistical underpinnings of latent variables, explore the fundamental principles of SEM, and equip you with the skills to specify, evaluate, and test SEM models in R, primarily utilizing the 'lavaan' package. Key topics covered in the course also include confirmatory factor analysis (CFA), the assessment of measurement invariance, path analysis, and power analysis for structural equation models.
Learning goals	1) Understand the principles of structural equation modeling and latent variables 2) Write, fit, and analyze a structural equation model in R 3) Implement a power analysis for structural equation models via simulation
Teaching methods	METHODOLOGY
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No

Prerequisites (not mandatory)	BASICS OF STATISTICAL INFERENCE AND LINEAR MODELS WITH R
Examination methods (if applicable)	Not applicable
Suggested readings page	All suggested readings will be available on the dedicated Moodle
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**CONDUCTING SYSTEMATIC REVIEWS**
SS	PSIC-01/A
Teacher in charge (if defined)	ENRICO SELLA
Teaching Hours	5
Number of ECTS credits allocated	1
Course period	1st (26/27 - 27/28)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☐ Yes ☒ No
Course unit contents	What is a systematic review? How do we formulate and develop a research question in a systematic review process? This methodology of evidence synthesis is commonly used in evidence-based decision-making in various fields, including psychological sciences. This course offers an introductory understanding of the systematic review process, from formulating a research question to synthesizing the evidence and reporting the findings. The key steps in conducting a systematic review, defining a review question, and developing a review protocol, as well as strategies for identifying relevant sources of evidence, will be covered. Furthermore, the course will provide recommended skills to assess the risk of bias and select appropriate methods for evidence synthesis.
Learning goals	1) Formulate the review question using systematic approach 2) Basic skills for literature search and study selection 3) Critical appraisal of included studies
Teaching methods	METHODOLOGY
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No

Prerequisites (not mandatory)	
Examination methods (if applicable)	Not applicable
Suggested readings page	All suggested readings will be available on the dedicated Moodle
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**INTRODUCTION TO ITEM RESPONSE THEORY**
SS	PSIC-01/C
Teacher in charge (if defined)	MARINA OTTAVIA EPIFANIA
Teaching Hours	15
Number of ECTS credits allocated	3
Course period	1st (26/27 - 27/28)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☐ Yes ☒ No
Course unit contents	This course presents an Introduction to Item Response Theory (IRT) models for dichotomous responses (e.g., true vs. false, correct vs. incorrect) with practical applications in R. According to IRT models, the observed response of a person to an item is a function of the characteristics of the person (i.e., the latent trait) and of the characteristics of the items, as described by both person's and item parameters. Different IRT models are available according to the number of parameters used for describing the functioning of the items. In order for the parameters obtained with the application of IRT models to be interpretable, a set of assumptions need to be met. The test of these assumptions, the evaluation of the fit of the models, and the implications and meaning of the item parameters will be illustrated through practical examples on real and simulated data. Moreover, the potential of these models for the thorough investigation of the item functioning will be illustrated by presenting both the item and test information functions and the methods for the identification of differential item functioning. Finally, the development of short test forms based on the item information function will be briefly illustrated.
Learning goals	1) Difference between Classical Test Theory and Item Response Theory 2) Critical thinking on the applicability of IRT models 3) Apply different IRT models, interpret the model fit, and the meaning of the item parameters 4) Investigate the item functioning under different perspectives (e.g., item information, differential item functioning)

Teaching methods	METHODOLOGY
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	
Examination methods (if applicable)	Not applicable
Suggested readings page	All suggested readings will be available on the dedicated Moodle
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**HOW TO WIN RESEARCH GRANTS**
SS	PSIC-01/B
Teacher in charge (if defined)	CHRISTIAN AGRILLO
Teaching Hours	5
Number of ECTS credits allocated	1
Course period	1st (26/27 - 27/28)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☐ Yes ☒ No
Course unit contents	Publish or Perish? Not only. We can especially perish by the lack of funds. While we continuously focus on paper writing, we often neglect the importance of grant applications, especially at the beginning of our academic career. This course aims to fill this gap, showing different types of grants, and providing tips for a successful grant application. At the end of the course, PhD students will be invited to present a short grant application, with a particular focus on the budget.
Learning goals	1) What is the proper grant for my purpose? 2) Which is the language I have to use for grant panels and for the reviewers? 3) What is the structure of ERC-like grants? 4) Grant interview: how does it work? 5) How do we prepare the budget section?
Teaching methods	SOFT SKILLS
Course on transversal, interdisciplinary, transdisciplinary skills	☒ Yes ☐ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	

Examination methods (if applicable)	Not applicable
Suggested readings page	All suggested readings will be available on the dedicated Moodle
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**CAREER COUNSELING**
SS	PSIC-01/B
Teacher in charge (if defined)	NICOLA CELLINI
Teaching Hours	10
Number of ECTS credits allocated	2
Course period	1st (26/27 - 27/28)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☐ Yes ☒ No
Course unit contents	Navigating through a doctoral school and surviving academia is not a trivial task. This course is designed to provide doctoral students with knowledge and tools to successfully navigate through this complex system. The first part of the course will provide information about how the Italian academic system works, such as the actual regulations about career steps, national scientific habilitation, and scientific disciplinary sectors. The second part of the course will focus on providing advice and suggestions for developing an optimal curriculum (CV), and to provide information on what to expect at the end of the doctoral program. The last part of the course will focus on writing the right CV for the different types of use (e.g., grant, award, post-doc application).
Learning goals	1) Understanding the academic system and its (implicit and explicit) regulations 2) How to plan an academic or an extra-academic career, during and after the PhD 3) How to write a successful CV
Teaching methods	SOFT SKILLS
Course on transversal, interdisciplinary, transdisciplinary skills	☒ Yes ☐ No

Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	
Examination methods (if applicable)	Not applicable
Suggested readings page	All suggested readings will be available on the dedicated Moodle
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**OUTSIDE ACADEMIA**
SS	
Teacher in charge (if defined)	ALESSIA BASTIANELLI
Teaching Hours	5
Number of ECTS credits allocated	1
Course period	1st (26/27 - 27/28)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☐ Yes ☒ No
Course unit contents	What skills does the PhD program in Psychological Science offer that can be useful outside academia? With a solid foundation in psychology and statistics, pioneering spin-offs and start-ups can be established in both fields, applying academic rigor and knowledge to practical applications in small company settings. The course will provide practical examples in HR Analytics, demonstrating how data collection and analysis tools can drive informed decision-making and enhance employee well-being in organizational settings.
Learning goals	1) Understanding the variety of job-market opportunities outside academia 2) Developing essential skills for founding a spin-off 3) Learning to translate academic knowledge into tangible solutions
Teaching methods	SOFT SKILLS
Course on transversal, interdisciplinary, transdisciplinary skills	☒ Yes ☐ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	

Examination methods (if applicable)	Not applicable
Suggested readings page	All suggested readings will be available on the dedicated Moodle
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**BASICS OF LINUX FOR DATA SCIENCE**
SS	PSIC-01/A
Teacher in charge (if defined)	FRANCESCO VESPIGNANI
Teaching Hours	5
Number of ECTS credits allocated	1
Course period	2nd (26/27 - 27/28)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☐ Yes ☒ No
Course unit contents	This course will introduce students to the use of GNU Core Utils, which are basic tools to interact with files, folders, and processes in a Unix-based OS. Differently from using Graphical User Interfaces like file browsers, word or excel, these utilities allow for the creation, transformation and adaptation of the files typically used in the scientific research from a terminal shell, without the need of using specialized software or languages. The shell language allows for piping different commands, allowing testing and checking immediately the results of these computations. The course will also underline how the knowledge of basics of Linux programming is extremely relevant for high performance computing and to produce FAIR (Findable - Accessible - Interoperable - Reusable) data, accomplishing requirement of the open science paradigm.
Learning goals	1) interact with files and with the file system using a shell command line terminal, 2) writing simple shell programs, 3) creating and manipulating pdf, html, flac/wav, svg/png, mov files, 4) manipulating text files by finding and replacing complex patterns and extracting specific pieces.
Teaching methods	PROGRAMMING
Course on transversal, interdisciplinary, transdisciplinary skills	☒ Yes ☐ No

Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	
Examination methods (if applicable)	Not applicable
Suggested readings page	All suggested readings will be available on the dedicated Moodle
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**COGNITIVE BIAS IN SCIENTIFIC RESEARCH**
SS	PSIC-01/A
Teacher in charge (if defined)	MARTA CASEROTTI
Teaching Hours	5
Number of ECTS credits allocated	1
Course period	2nd (26/27 - 27/28)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☐ Yes ☒ No
Course unit contents	The proposed seminar will provide doctoral students with a concise overview of the psychology of judgment and decision-making, followed by a discussion on biases in scientific research. Biases can arise when a systematic error is introduced during sampling or experimentation, leading to a preference for one particular outcome or response. These biases can occur at any stage of research, from study design to data collection, through to data analysis and publication. They can result in erroneous or misleading conclusions that fail to accurately represent the true nature of the studied phenomenon.
Learning goals	1) Explore the primary types of bias that are typical in the key stages of research and propose strategies for mitigating them. 2) Understanding bias and its impact on research is crucial for enhancing the quality of their studies.
Teaching methods	THEMATIC COURSE
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	

Examination methods (if applicable)	Not applicable
Suggested readings page	All suggested readings will be available on the dedicated Moodle
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**WELL-BEING IN ACADEMIA: FOSTERING SELF-DETERMINED MOTIVATION**
SS	PSIC-01/A
Teacher in charge (if defined)	ANGELICA MOE'
Teaching Hours	5
Number of ECTS credits allocated	1
Course period	2nd (26/27 - 27/28)
Course delivery method	☐ In presence ☒ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☐ Yes ☒ No
Course unit contents	Experiencing stress, loneliness, anxiety or feeling of uncertainty is common in academia and can impact on overall well-being. To face these potential burdens students need to be empowered by a range of personal resources including autonomous motivation. This course will lead to discovering the personal levels of intrinsic motivation and to learn tools to improve and maintain it mostly in the face of setbacks, failures or personal weaknesses.
Learning goals	1. Recognize personal needs and motivations 2. Increase awareness of self-motivating styles 3. Favour beliefs and attitudes aimed at fostering adoption of effective self-motivating strategies
Teaching methods	SOFT SKILLS
Course on transversal, interdisciplinary, transdisciplinary skills	☒ Yes ☐ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	
Examination methods	Not applicable

(if applicable)	
Suggested readings page	All suggested readings will be available on the dedicated Moodle
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**RELEVANCE, USE AND APPLICATION OF META-ANALYSIS**
SS	PSIC-01/C
Teacher in charge (if defined)	GIANMARCO ALTOÈ
Teaching Hours	5
Number of ECTS credits allocated	1
Course period	2nd (26/27 - 27/28)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☐ Yes ☒ No
Course unit contents	Meta-analysis is a statistical method that allows for the quantitative synthesis of the results from multiple studies. These studies can involve existing literature or can be pre-planned studies following the same protocol (i.e., multi-lab studies). Currently, meta-analysis has assumed a crucial role in science and is indispensable in the toolkit of a psychologist researcher. This course will present various statistical models of meta-analysis from both a theoretical and applied perspective (using R software). Special emphasis will be placed on the critical interpretation of meta-analysis findings.
Learning goals	1) Approach scientific questions with a meta analytical mindset 2) Use the most appropriate meta analysis models and create their associated graphical representations through the R software 3) Evaluate the critical aspects of a meta analysis
Teaching methods	METHODOLOGY
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	CONDUCTING SYSTEMATIC REVIEWS

Examination methods (if applicable)	Not applicable
Suggested readings page	All suggested readings will be available on the dedicated Moodle
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**DATA SIMULATION IN PSYCHOLOGICAL STUDIES**
SS	PSIC-01/C
Teacher in charge (if defined)	MASSIMILIANO PASTORE
Teaching Hours	10
Number of ECTS credits allocated	2
Course period	2nd (26/27 - 27/28)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☐ Yes ☒ No
Course unit contents	Data simulation plays a crucial role in comprehending and assessing models for data analysis. This course naturally extends from Power and Design Analysis, aiming to provide practical application tools. It will feature examples of simulations for linear, logistic, and reaction time models within the R environment.
Learning goals	1) Principles of data simulation 2) Simulation techniques for normal (univariate and multivariate), dichotomous, and non-normal variables 3) A priori power analysis
Teaching methods	METHODOLOGY
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	BASICS OF STATISTICAL INFERENCE AND LINEAR MODELS WITH R
Examination methods (if applicable)	Not applicable

Suggested readings	All suggested readings will be available on the dedicated Moodle page
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**PUBLISHING IN HIGH-IMPACT JOURNALS**
SS	PSIC-03/A
Teacher in charge (if defined)	MARA CADINU
Teaching Hours	15
Number of ECTS credits allocated	3
Course period	2nd (26/27 - 27/28)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☐ Yes ☒ No
Course unit contents	Practical exercises - using each student's own area of research as training ground - will accompany traditional teaching in order to help doctoral students develop the basic skills needed for publishing in top international journals. Students will be asked to bring to class the following parts of one of their own unpublished manuscripts: abstract, first paragraph of introduction, aims & hypothesis section of introduction, first and last paragraph of discussion section.
Learning goals	1) To write a good first paragraph of an introduction 2) To write a good abstract 3) To write aims & hypothesis section of introduction
Teaching methods	SOFT SKILLS
Course on transversal, interdisciplinary, transdisciplinary skills	☒ Yes ☐ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	
Examination methods (if applicable)	Not applicable

Suggested readings	All suggested readings will be available on the dedicated Moodle page
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**PSYCHONEUROENDOCRINOLOGY, PMD AND FEMALE SEXUALITY**
SS	PSIC-03/A
Teacher in charge (if defined)	JEFF KIESNER
Teaching Hours	5
Number of ECTS credits allocated	1
Course period	2nd (26/27 - 27/28)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☐ Yes ☒ No
Course unit contents	This short course will focus on the links between psychological states and experiences, endocrinological changes, and neurological changes. One specific model that will be examined are the hormonal, neurological, and psychological changes across the menstrual cycle.
Learning goals	1) Understand the basic structures and functions of the steroidal signaling and how it effects the neurological system 2) Understand the complexity of steroid changes on neurological and psychological functioning
Teaching methods	THEMATIC COURSE
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	
Examination methods (if applicable)	Not applicable

Suggested readings	All suggested readings will be available on the dedicated Moodle page
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**OPEN SCIENCE, PRE-REGISTRATION AND MULTI-LAB STUDIES**
SS	
Teacher in charge (if defined)	GIULIA CALIGNANO
Teaching Hours	5
Number of ECTS credits allocated	1
Course period	TBD (26/27 - 27/28)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☐ Yes ☒ No
Course unit contents	This course offers hands-on skills and expert knowledge to help early-career researchers embrace and adopt the Open Science paradigm in their regular research routine: from the idea to the publication. Specifically, it informs doctoral candidates about critical tools for (1) addressing the challenges and capitalizing on the opportunities of pre-registration, and (2) taking initial steps towards the understanding and participating in multi-lab studies. The course is designed to emphasize the need for robustness and credibility in Psychology as a Science, through practical actions that make research useful for society and extend beyond personal careers.
Learning goals	1) Pre-registration: understanding the process and the tools to pre-registering hypotheses and methods. 2) Designing and participating in Multi-lab studies: basic skills necessary to collaborate on large-scale research projects that confirm the reproducibility and robustness of scientific results.
Teaching methods	SOFT SKILLS
Course on transversal, interdisciplinary, transdisciplinary skills	☒ Yes ☐ No
Available for PhD students from other courses	☒ Yes ☐ No

Prerequisites (not mandatory)	
Examination methods (if applicable)	Not applicable
Suggested readings page	All suggested readings will be available on the dedicated Moodle
Additional information	Any additional information will be provided through the dedicated Moodle page

Course unit English denomination	**NEUROMODULATION: LEARNING TO USE A HYBRID EEG/tES TOOL**
SS	PSIC-01/A
Teacher in charge (if defined)	LUCA BATTAGLINI
Teaching Hours	5
Number of ECTS credits allocated	1
Course period	TBD (26/27 - 27/28)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	ENGLISH
Mandatory attendance	☐ Yes ☒ No
Course unit contents	This short course offers hands-on skills and expert knowledge to help early-career researchers learn how to use a hybrid system for delivering transcranial electrical stimulation and recording electroencephalography (EEG). Practical applications of hybrid EEG/tES systems in research or clinical settings will be demonstrated, and safety considerations and guidelines for using neuromodulation tools will be discussed.
Learning goals	Gain hands-on experience in integrating tES and EEG into a hybrid brain stimulation/monitoring system.
Teaching methods	THEMATIC COURSE
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	
Examination methods (if applicable)	Not applicable

Suggested readings	All suggested readings will be available on the dedicated Moodle page
Additional information	Any additional information will be provided through the dedicated Moodle page