Course unit English denomination	**Computer-assisted research**
SS	INFO-01/A
Teacher in charge (if defined)	Eleonora Losiouk (INFO-01/A)
Teaching Hours	6
Number of ECTS credits allocated	1
Course period	1st semester
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☐ Yes (…% minimum of presence) ☒ No
Course unit contents	The course will address the following topics: • Time management (shared calendar and alarms, polls for events) • Identification and understanding of scientific references (structured bookmarks, digital repositories, etc.) • Bibliography management and bibliographic styles • Organization of reference databases (standard, metadata, privacy) • Remote sharing (Dropbox, Google Docs, Drive, etc.) • Support for scientific writing (tools, structural methods, versioning, styles, etc.) • Translation and language support (dictionaries, translators, forums, common practice to avoid naïve translations) • Support for delivering presentations (tools, styles, image handling, best practices) • Use of Virtual Machines to host and share specialized environments (tools, best practice)
Learning goals	The course aims to provide best practices and guidelines for the effective and efficient use of computer-based tools, resources and methods to support scientific research.
Teaching methods	in person

Course on transversal, interdisciplinary, transdisciplinary skills	☒ Yes ☐ No
Available for PhD students from other courses	☒ Yes ☐ No Limited (see BMCS website for details)
Prerequisites (not mandatory)	None
Examination methods (if applicable)	None
Suggested readings	In the course Moodle
Additional information	

Course unit English denomination	**Explainable Artificial Intelligence**
SS	INFO-01/A
Teacher in charge (if defined)	Roberto Confalonieri (INFO-01/A)
Teaching Hours	6
Number of ECTS credits allocated	1
Course period	2nd semester
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☐ Yes (% minimum of presence) ☒ No
Course unit contents	• A historical perspective of Explainable AI • Taxonomy of explanation and evaluation approaches • Model-specific explanation approaches • Model-agnostic explanation approaches • The role of ontologies in Explainable AI
Learning goals	The aim of this course is to underscore the importance of Explainable AI, introduce various explanation methods and techniques, and demonstrate the role of ontologies in enhancing the perceived understandability of explanations for users.
Teaching methods	in person
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No Limited (see BMCS website for details)
Prerequisites (not mandatory)	BMCS course: "Tools and applications of machine learning"

Examination methods (if applicable)	None
Suggested readings	In the course Moodle
Additional information	

Course unit English denomination	**Foundations of cognitive neuroscience**
SS	PSIC-01/A
Teacher in charge (if defined)	(to be assigned)
Teaching Hours	9
Number of ECTS credits allocated	1,5
Course period	1st semester
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☒ Yes (70% minimum of presence) ☐ No
Course unit contents	- Introduction to the branches of Cognitive neurosciences - Neuroanatomy - Neuroimaging and neurostimulation techniques - Introduction to neuropsychology
Learning goals	The aim of the course is to introduce students to the topic of cognitive neurosciences. An initial definition of the field will be followed by a short journey in the domain of Neuropsychology, defined as the study of the effects of brain lesions on human mental processes and behavior.
Teaching methods	in person
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No Limited (see BMCS website for details)
Prerequisites (not mandatory)	None

Examination methods (if applicable)	Modality - Within a week from the end of the course, the PhD students will be asked to upload, on Moodle, a brief research project proposal combining theories and techniques of Cognitive neurosciences. The project should be based on the application of Cognitive neurosciences on both Curricula (i.e., Neuroscience, Technology And Society-Computer Science for Societal Challenges and Innovation). Goal - To concretely apply the theoretical concepts presented during the course. To stimulate integration of notions and approaches from all the scientific fields involved in Cognitive neurosciences. To prepare students to concisely and coherently draft and write a research project proposal in the field of Cognitive neurosciences. Skills acquired with the exam - Planning a study in the field of Cognitive neurosciences by combining concepts and notions of Neuroanatomy, Neuroimaging, Brain stimulation, and Neuropsychology. Feedback - Feedback will be provided on Moodle. Although the feedback will be provided by the lecturer (individual and personalized), all PhD students will be prompted to comment on the presented projects (peer review).
Suggested readings	In the course Moodle
Additional information	

Course unit English denomination	**Graphs and statistics with R**
SS	PSIC-01/C
Teacher in charge (if defined)	Massimo Nucci (PSIC-01/C)
Teaching Hours	9
Number of ECTS credits allocated	1,5
Course period	2nd semester
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☐ Yes (% minimum of presence) ☒ No
Course unit contents	• Introduction to R software: • Descriptive statistics and graphical representation of data • Run and comment on statistical analysis and graphical representation of custom data
Learning goals	The course aims to introduce students to the basic concepts of R software and to use them to begin data analysis by graphing descriptive statistics.
Teaching methods	in person
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No Limited (see BMCS website for details)
Prerequisites (not mandatory)	BMCS course: "Methodological and statistical foundations of experimental studies with humans"
Examination methods (if applicable)	None

Suggested readings	In the course Moodle
Additional information	

Course unit English denomination	**How to write and present scientific results**
SS	PSIC-04/A, INFO-01/A
Teacher in charge (if defined)	Silvia Salcuni, Tullio Vardanega (PSIC-04/A, INFO-01/A)
Teaching Hours	15
Number of ECTS credits allocated	2,5
Course period	1st semester
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☒ Yes (70% minimum of presence) ☐ No
Course unit contents	• Introduction to oral presentation skills: preparing your talk, from drafting to delivery. Structure, style, and timing of oral presentation. The “to-do list” of public speaking. Talks with different purposes and audiences (dissemination vs. scientific peers) will be presented. • Training oral presentation skills: Coimbra three Minutes Competition rules. • The structure and style of scientific writing: journals guidelines; main editorial norms; how to write a scientific paper; how to manage Editors and Reviewers’ requests; examples of good and poor scientific writing. • Practicing scientific writing: drafting: the golden rules of a scientific writer (workgroup assignments); editing (editing skills are a fundamental component of scientific writing). • Paper Revising and Replying to Editors • Response letters
Learning goals	The main aim of the course is to provide Ph.D. students with a method to communicate and disseminate their research results. Examples of oral presentations and scientific papers in the field of Psychology, Computer Sciences and Neurosciences will be presented and discussed with the students.
Teaching methods	in person

Course on transversal, interdisciplinary, transdisciplinary skills	☒ Yes ☐ No
Available for PhD students from other courses	☒ Yes ☐ No Limited (see BMCS website for details)
Prerequisites (not mandatory)	None
Examination methods (if applicable)	Modality - One week to the end of the course, the students, self-organized in small-sized interdisciplinary groups, are task with: (1) selecting a journal publication of their common interest, (2) analyzing it in accord with the "how-to-write" criteria discussed in the course, (3) creating a synthesis review of that paper as if it was a fresh submission, (4) presenting their review publicly and discussing it with the instructors and peers. Goal - To apply the guidance exposed in the course; to adjust prior beliefs on the course themes; to reflect on the vulnerabilities of conceiving, exposing (orally or in writing), and evaluating scientific products. Skills acquired with the exam - Navigating, in an extremely accelerated manner, the journey that joins conceiving scientific work to contributing to the peer review process that sanctions the contents of state-of-the-art literature. Feedback - The course style, including the exam, is maximally orientated to providing immediate and direct feedback to students by way of comments and group-level discussion.
Suggested readings	In the course Moodle
Additional information	

Course unit English denomination	**Human and machine vision**
SS	INFO-01/A, PSIC-01/A
Teacher in charge (if defined)	Lamberto Ballan, Gianluca Campana (INFO-01/A, PSIC-01/A)
Teaching Hours	15
Number of ECTS credits allocated	2,5
Course period	1st semester
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☒ Yes (70% minimum of presence) ☐ No
Course unit contents	- The concept of receptive field - Parvo and magno pathways - From image processing and early vision to high-level visual recognition (in our brain) - Machine perception and computer vision - From image processing and early vision to high-level visual recognition (in machines) A brief introduction to convolutional neural networks and their applications (ranging from security and surveillance, smart mobility, robotics, self-driving cars, etc.)
Learning goals	This course will show the basic mechanisms and processing of human vision, with particular emphasis on the increasing complexity of receptive fields along the visual hierarchy, and the way such mechanisms have been implemented in computers.
Teaching methods	in person
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No

Available for PhD students from other courses	☒ Yes ☐ No Limited (see BMCS website for details)
Prerequisites (not mandatory)	None
Examination methods (if applicable)	Modality - On the last day of the course, students will be asked to give a group presentation (approximately four people per group) on a scientific article covering topics at the intersection between human and machine vision. Students may choose from a selection of articles uploaded on Moodle, but they also have the option to propose an alternative article not included in the Moodle selection (pending prior approval from the instructors). Goal - To encourage the integration of concepts and approaches from the two main fields covered in this course. Skills acquired with the exam - Through this exam, students will develop skills in presenting and explaining interdisciplinary hypotheses, methods, and results to a broad audience. Feedback - Feedback will be provided following each presentation, with input from both instructors and peers (the latter via Wooclap, with a focus on the clarity of the presentation).
Suggested readings	In the course Moodle
Additional information	

Course unit English denomination	**Human Cognition and Artificial Intelligence**
SS	INFO-01/A
Teacher in charge (if defined)	Alberto Testolin (INFO-01/A)
Teaching Hours	6
Number of ECTS credits allocated	1
Course period	2nd semester
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☐ Yes (% minimum of presence) ☒ No
Course unit contents	-Introduction to the computational approach to understanding human cognition. - Symbolic vs. emergentist models. - Bayesian rationality and structured probabilistic models. - Case studies from the cognitive modeling literature.
Learning goals	The aim of the course is to introduce the student to the leading frameworks to understand human cognition from a computational perspective. This is relevant both for understanding how the mind works as well as for the design of advanced artificial intelligence systems. The course will introduce the student to philosophical debates in the study of the mind/brain problem and then focus on the connectionist approach for studying the neurocomputational bases of cognition. Theoretical discussion will be complemented by case studies from the cognitive modeling literature and from the recent progresses in AI research.
Teaching methods	in person

Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No Limited (see BMCS website for details)
Prerequisites (not mandatory)	Basic knowledge of probability theory and machine learning.
Examination methods (if applicable)	None
Suggested readings	In the course Moodle
Additional information	

Course unit English denomination	**Legal, ethical and societal issues in ICT**
SS	GIUR-11/B
Teacher in charge (if defined)	Andrea Pin, Elena Spiller (GIUR-11/B)
Teaching Hours	6
Number of ECTS credits allocated	1
Course period	2nd semester
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☐ Yes (% minimum of presence) ☒ No
Course unit contents	Comparative Approaches to the Legal Challenges of AI (specifically EU, the US, and China) - the ideals of consent and control - the conceptualizations of public interest - the insufficiency of data protection. EU regulations for digital data and A.I. - the concept of technological risk - the role of humans in the AI functioning - the use of AI for healthcare, in general
Learning goals	This course aims to analyze the legal, ethical and societal implications of current digital technologies and to be acquainted with the main aspects of the legal frameworks regulating their deployment.
Teaching methods	in person
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No Limited (see BMCS website for details)

Prerequisites (not mandatory)	None
Examination methods (if applicable)	None
Suggested readings	In the course Moodle
Additional information	

Course unit English denomination	**Methodological and statistical foundations of experimental studies with humans**
SS	PSIC-01/A, PSIC-01/B
Teacher in charge (if defined)	Massimo Grassi, Fabio Masina (PSIC-01/A, PSIC-01/B)
Teaching Hours	18
Number of ECTS credits allocated	3
Course period	2nd semester
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☐ Yes (70% minimum of presence) ☐ No
Course unit contents	• Basic concepts in methodology. • Experimental variables • Experimental, quasi-experimental and correlational studies • Longitudinal studies, Replication studies; Multi-lab studies • Sample selection and sample size • Clinical trials - Parametric and non-paranetric inferential tests - Metaanalysis with R metafor package
Learning goals	The course provides the methodological resources to design a study with human participants, including a description of the main study formats and inferential statistical tests. It also explains how to carry out a metaanalysis to support a systematic review of the literature.
Teaching methods	in person
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No Limited (see BMCS website for details)

Prerequisites (not mandatory)	None
Examination methods (if applicable)	Modality - By the end of the course, students will be required to draft and present a topic for a systematic review on a subject that interests them. This draft should incorporate key concepts covered throughout the course, such as the distinction between various experimental designs. Students will work in cross-curricular groups of 3 to 4 persons. Goal - To understand and apply key methodological concepts for designing studies with human participants. To collaborate effectively in small groups to draft a systematic review topic. Skills acquired with the exam - Students will develop the ability to design research studies involving human participants and will learn to conduct and interpret systematic reviews and meta-analyses. Feedback - Feedback will be provided throughout the entire course and during the group oral presentations of their drafts for systematic reviews.
Suggested readings	In the course Moodle
Additional information	

Course unit English denomination	**Natural Language Processing**
SS	INFO-01/A
Teacher in charge (if defined)	Giovanni Da San Martino (INFO-01/A)
Teaching Hours	12
Number of ECTS credits allocated	2
Course period	1st semester
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☒ Yes (70% minimum of presence) ☐ No
Course unit contents	• Natural Language Processing pipelines versus end-to-end models • How to represent words and sentences in a (machine-learning) algorithm • Natural Language Processing tasks requiring ad hoc modeling: an overview
Learning goals	The course reviews how words, sentences and entire documents are represented and some natural language processing tasks requiring ad hoc modeling strategies, such as information extraction and text span identification.
Teaching methods	in person
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No Limited (see BMCS website for details)
Prerequisites (not mandatory)	None

Examination methods (if applicable)	Modality - The PhD students will select a problem which is at the intersection of NLP and Neuroscience. They would critically analyse the state of the art and make a project proposal. It is also possible to provide experimental results. The students will be divided into cross-curricular groups (approximately four people per group). In the last lecture of the course the students would give a presentation about the work they have done. The work will be evaluated according to the scientific rigor demonstrated. Goal - conducting rigorous interdisciplinary research. Skills acquired with the exam - understanding of NLP tasks and applications; ability to work in an interdisciplinary group. Feedback - Each group will receive feedback right after the presentation both by the teacher and the other students.
Suggested readings	In the course Moodle
Additional information	

Course unit English denomination	**Opportunities and advantages of building research infrastructures**
SS	BIOS-07/A
Teacher in charge (if defined)	Silvio Tosatto (BIOS-07/A)
Teaching Hours	6
Number of ECTS credits allocated	1
Course period	1st semester
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☐ Yes (% minimum of presence) ☒ No
Course unit contents	• Types of research infrastructures (e.g. ESFRI, EOSC) • Managing and sustaining a research infrastructure over its lifetime • Case studies of successful international research infrastructures (e.g. ELIXIR)
Learning goals	This course explores the opportunities and advantages of developing large-scale research infrastructures, with a strong focus on European Union (EU) funding programs and international cooperation such as ESFRI (European Strategy Forum on Research Infrastructures) and EOSC (European Open Science Cloud). The course also highlights the role of early-career researchers in contributing to research infrastructures with a concrete case study provided by ELIXIR, the ESFRI infrastructure for life science data
Teaching methods	in person
Course on transversal, interdisciplinary, transdisciplinary skills	☒ Yes ☐ No
Available for PhD students from other courses	☒ Yes ☐ No

Prerequisites (not mandatory)	None
Examination methods (if applicable)	None
Suggested readings	In the course Moodle
Additional information	

Course unit English denomination	**Principles of Computational creativity**
SS	IINF-05/A
Teacher in charge (if defined)	Antonio Rodà (IINF-05/A)
Teaching Hours	6
Number of ECTS credits allocated	1
Course period	2nd semester
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☐ Yes (% minimum of presence) ☒ No
Course unit contents	• Introduction to human creativity and information-processing theories. • Interactive tools for aiding/augmenting/amplifying human creativity. • Autonomous creative systems: cognitive vs. engineering approach; creativity as search. • Case studies of computational creativity: The painting fool, AARON, Poem machine, Musical intelligence. • Methods for evaluating creativity
Learning goals	This course will introduce Computational Creativity, an interdisciplinary sub-field of Artificial Intelligence, that intersects directly with many other fields, including psychology, cognitive science, mathematics and engineering, to name a few, and indirectly with any number of application domains, from musical composition to the culinary arts to scientific discovery.
Teaching methods	in person
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No Limited (see BMCS website for details)

Prerequisites (not mandatory)	None
Examination methods (if applicable)	None
Suggested readings	In the course Moodle
Additional information	

Course unit English denomination	**Python for non-computer scientists**
SS	INFO-01/A
Teacher in charge (if defined)	Polato (UniTO) (INFO-01/A)
Teaching Hours	12
Number of ECTS credits allocated	2
Course period	1st semester
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☐ Yes (% minimum of presence) ☒ No
Course unit contents	• Introduction to the Python programming language, and Google Colab/Jupyter Notebook • Python basics: built-in data types, basic expressions, control flow, and functions • Installation and import of external modules, and how to use the official documentation • Data manipulation with pandas • Data analysis with pandas and numpy/scipy • Data visualization with matplotlib/seaborn/plotly
Learning goals	This course aims at providing skills, tools, and methodologies for manipulating and analyzing data using Python.
Teaching methods	in person
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No Limited (see BMCS website for details)

Prerequisites (not mandatory)	None
Examination methods (if applicable)	None
Suggested readings	In the course Moodle
Additional information	

Course unit English denomination	**Seminars on scenarios of Internet of Things**
SS	INFO-01/A
Teacher in charge (if defined)	Tullio Vardanega (INFO-01/A)
Teaching Hours	6
Number of ECTS credits allocated	1
Course period	2nd semester
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☐ Yes (% minimum of presence) ☒ No
Course unit contents	The course is a collection of three focused seminars, which explore complementary facets of ambits where the IoT concepts are making an impact. 1. IoT scenarios in smart cities, prof. Andrea Zanella, DEI, UNIPD 2. IoT scenarios in e-heath, prof. Giulia Cisotto, DEI, UNIPD 3. IoT as digital enveloping, prof. Tullio Vardanega, DM, UNIPD .
Learning goals	The course introduces the concept of IoT, its foundations for vision and architecture, and its use prospects. The Internet of Things extends digital connectivity to physical entities and real-world situations, giving rise to extraordinary opportunities to conceive, realize, and deliver value-added services, including cognitive and life-support aid, smart devices.
Teaching methods	in person
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No Limited (see BMCS website for details)

Prerequisites (not mandatory)	None
Examination methods (if applicable)	None
Suggested readings	In the course Moodle
Additional information	

Course unit English denomination	**Technologies for sport performance analysis**
SS	MEDF-01/A
Teacher in charge (if defined)	Federico Gennaro (MEDF-01/A)
Teaching Hours	6
Number of ECTS credits allocated	1
Course period	2nd semester
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☐ Yes (% minimum of presence) ☒ No
Course unit contents	• 5 “Ws” of sport technology for sport performance analysis in team and individual sports. • Techniques and technologies of sport performances analysis by external workload (e.g., Inertial Measurement Units) and internal workload (e.g., wireless surface electromyography and electroencephalography). • Big Data, Machine Learning and Artificial Intelligence applied to sport technology for sport performance analysis. • Choosing the right sport technique and technology for performance analysis: focus on the interpretation of different outcomes.
Learning goals	This course aims to provide basic cross-disciplinary knowledge based on the intersection of different topics: human movement sciences, neurophysiology, and computer sciences. Theory and, when possible, practical hands-on sessions will provide the necessary toolkit for a sound basic understanding of wearable sensors and big data analysis methods applied to sport performance analysis.
Teaching methods	in person
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No

Available for PhD students from other courses	☒ Yes ☐ No Limited (see BMCS website for details)
Prerequisites (not mandatory)	None
Examination methods (if applicable)	None
Suggested readings	In the course Moodle
Additional information	

Course unit English denomination	**Text mining**
SS	INFO-01/A
Teacher in charge (if defined)	Bernardo Magnini (FBK) (INFO-01/A)
Teaching Hours	6
Number of ECTS credits allocated	1
Course period	1st semester
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☐ Yes (% minimum of presence) ☒ No
Course unit contents	• Text mining: research field and applications • Machine learning approach: methodology, task definition, training and test data, evaluation metrics • Distributional semantics and embeddings • Deep learning for text mining: neural networks and transformers • A case study: sentiment analysis
Learning goals	The course will give an overview of methodologies and tools in the field of Computational Linguistics, useful for operating actively in this sector starting from a background both in computer science and in human sciences. It will provide an introduction to recent approaches and technologies in text mining, with particular attention to vector-based representations of word meanings and machine-learning algorithms.
Teaching methods	in person
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No Limited (see BMCS website for details)

Prerequisites (not mandatory)	None
Examination methods (if applicable)	None
Suggested readings	In the course Moodle
Additional information	

Course unit English denomination	**Tools and Applications of Machine Learning for Social Challenges**
SS	INFO-01/A, PSIC-03/A
Teacher in charge (if defined)	Nicolò Navarin, Merylin Monaro (INFO-01/A, PSIC-03/A)
Teaching Hours	18
Number of ECTS credits allocated	3
Course period	1st semester
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☐ Yes (% minimum of presence) ☒ No
Course unit contents	• Introduction to machine learning tools and their correct use. • What machine learning tools can achieve: supervised vs unsupervised techniques. • Examples of applications and how to assess performances. • Introduction to cognitive services. • Case studies
Learning goals	The course is divided into two parts. The first part provides a practical understanding of basic machine learning tools and their use. The second part of the course is focused on understanding how machine learning techniques can be applied to answer research questions in psychology (case studies)
Teaching methods	in person
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No Limited (see BMCS website for details)
Prerequisites	BMCS course: "Python for non-computer scientists"

(not mandatory)	
Examination methods (if applicable)	Modality - The PhD students are asked to carry on a group interdisciplinary project involving the application of machine learning techniques to answer research questions in psychology. These projects are done collaboratively by cross-curricular groups. In the last lecture of the course, the students will present their projects. The projects will be evaluated based on the level of collaborative work required, and the quality of the experimental design and technical skills. Moreover, students are encouraged to interact with the presentations of their colleagues. Goal - To prepare students to conduct inter-disciplinary research, and practice their ability to apply theoretical knowledge to real-world problems. Skills acquired with the exam - Basic understanding of machine learning techniques; ability to recognise and properly formulate a machine learning problem; technical abilities in developing a machine learning pipeline; ability to work collaboratively with colleagues with a different background, Feedback - After each group's presentation, general feedback is provided in class. The exam feedback is provided to each student in the Moodle platform or via email.
Suggested readings	In the course Moodle
Additional information	

Course unit English denomination	**Tools for on-line experiments**
SS	PSIC-01/A
Teacher in charge (if defined)	Giulio Contemori (PSIC-01/A)
Teaching Hours	12
Number of ECTS credits allocated	2
Course period	1st semester
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☐ Yes (% minimum of presence) ☒ No
Course unit contents	Throughout the course, we will delve into two distinct open-source solutions: Psychopy (utilizing its graphical interface, the Builder) and jsPsych (a JavaScript library). Additionally, we will cover the setup and execution of online studies using the JATOS server (Just Another Tool for Online Studies). The course content includes: • Introduction to Web-based experiments • Execution of Web-based experiments • Study development using the Psychopy Graphical Interface • Study development with the jsPsych JavaScript library • Running studies in JATOS and managing data collection
Learning goals	This class serves as an introductory guide to conducting human behavioral experiments online, focusing particularly on accuracy, reaction times, and psychophysical methods. Participants will learn how to design and execute experiments or questionnaire surveys using web-based platforms with open-source, reproducible procedures, share experiments with others and store data online.
Teaching methods	in person
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No

Available for PhD students from other courses	☒ Yes ☐ No Limited (see BMCS website for details)
Prerequisites (not mandatory)	None
Examination methods (if applicable)	None
Suggested readings	In the course Moodle
Additional information	

Course unit English denomination	**User studies in human-computer interaction**
SS	PSIC-03/A
Teacher in charge (if defined)	Anna Spagnolli (PSIC-03/A)
Teaching Hours	15
Number of ECTS credits allocated	2,5
Course period	2nd semester
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☒ Yes (70% minimum of presence) ☐ No
Course unit contents	- Basic notions of HCI (user, interface, affordance, stakeholders) - Designing for meaning: modeling HCI as a communication process - Methods to involve the users in the design - Evaluating the user experience (performance, satisfaction, usability, presence, fun, acceptance, credibility)
Learning goals	This course introduces the main concepts and methods to design a new technology and asses that its compatibility with the constraints of the usage context, and the task goals.
Teaching methods	in person
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No Limited (see BMCS website for details)
Prerequisites (not mandatory)	BMCS course: "Methodological foundations in experimental studies with humans"

Examination methods (if applicable)	Modality - The PhD students are asked to carry out some activities in class during the course to practice the concepts explained. These activities are done collaboratively by cross-curricular groups. Within a week from the end of the course, they will upload on the Moodle platform of the course a study description, combining and improving the study outline they have drafted during the course. Goal - To practice study planning in the area of user studies, applying the concepts of user-based evaluation explained during the course Skills acquired with the exam - Planning the main skeleton of a user study, including the specific data collection tools to be used; peer-based feedback; interdisciplinary collaboration Feedback - General feedback on the class activities is provided in class. Exam feedback is provided in the Moodle platform.
Suggested readings	In the course Moodle
Additional information	