Research options available

Research topic(s) offered by every Doctoral Course involved in UNIPhD are frameworks within which every applicant has to present an original research project in collaboration with a Supervisor at the University of Padua.

Potential Supervisors at Unipd have proposed the following detailed research options, which are related to the research topic. They are offered as a guideline and should facilitate your contact with potential Supervisors. Supervisors' e-mail is specified in every research option table. You are welcome to contact them directly.

Note that this research option list is not at all exhaustive and, within the topic you have chosen, you are free to propose a different research project.

Doctoral Course	**BRAIN, MIND AND COMPUTER SCIENCE**
Macro-area	Cross-domain Physical Sciences and Engineering / Life Sciences
Department name	Department of General Psychology
Webpage	*http://hit.psy.unipd.it/BMCS*
Research topic	**Neuroscience, technology and society** Projects within this topic focus on innovative research in cognitive science, and neuroscience applied to the emerging technologies and bearing societal relevance. Projects in this curriculum deal with psychological issues and opportunities raised by the tight interdependence between humans and machines and adopt investigation techniques that address such interdependence directly. Domains belonging to this curriculum include human-computer interaction, cybertherapy, brain-computer interfaces, assistive technologies for sensorial, perceptive and cognitive problems, computational cognitive neuroscience and biomedics as well as topics related to smart communities.
Link to the UNIPhD Call (Academic Year 2023/2024)	*https://uniphd.eu*
Latest Update	*2.12.2022*
#Number of available Research Options	*4* *Scroll down to see all the Research Options*

1 Research Option Description

Doctoral Course	**Brain, Mind and Computer Science**
Department name	Department of General Psychology
Research topic	Neuroscience, technology and society
Research option	Designing Human Centric Cognitively Adaptive Workstation and Cobots
Supervisor	Luciano Gamberini luciano.gamberini@unipd.it
Webpage	https://www.dpg.unipd.it/en/luciano-gamberini
Context of the research activity and objectives	This project topic concerns the use of cognitively adaptive solutions to design ergonomic and inclusive solution for assembly and tightening industrial lines. A Human-Centric, cobot-based workplace needs to start from the users' needs, skills and resources. Bio-sensing and neurocognitive technologies can be adopted to reach higher productivity as well as life and work satisfaction; they can also allow to include fragile workers in the labour market.
Infrastructures	Software assisting qualitative analysis (Noldus The Observer XT) and tool for monitoring/analysis eyes' behaviour (i.e., SMI RED500 500Hz remote eye tracker; Pupil Labs 120Hz/200Hz binocular glasses); a wearable 5-channels Procomp5 Infiniti amplifier (Thought Technology Ltd) and dedicated sensors (e.g., surface electrodes) for gathering/analysing of psychophysiological data (e.g., skin conductance, heart-rate, electromyography).
Skills and competencies for the development of the activity	Background in ergonomics, human-computer interaction, psychophysiological data
Training offer	Foundations of cognitive neuroscience, Human computer interaction, Cognition and computations, tools/applications of machine learning
Possible Secondments	Non-academic: **B.N.P srl (supervisor: dr. Carlo Pettenon)** (https://bnpsrl.com) BNP provides ergonomic solutions for assembly and industrial tightening. Academic: **University of Helsinki (supervisor: dr. Giulio Jacucci)** Prof Jacucci is Professor at the Det. of Computer Science and director of the Network Society Programme at the Helsinki Institute for Information Technology. (https://researchportal.helsinki.fi/en/persons/giulio-jacucci)

2 Research Option Description

Doctoral Course	**Brain, Mind and Computer Science**
Department name	Department of General Psychology
Research topic	Neuroscience, technology, and society
Research option	Aligning privacy notices terminology and user's concerns: A framework to support human-centred transparency
Supervisor	Anna Spagnolli anna.spagnolli@unipd.it
Webpage	https://www.dpg.unipd.it/en/anna-spagnolli
Context of the research activity and objectives	The research activity aims at providing a framework to organize and convey privacy policy information in a way that is genuinely transparent to lay users. Such framework will allow the users to find the text segment addressing their concerns and decision criteria. The project will: a) identify user-centred privacy categories; b) create dictionaries to automatically map the user-based categories into a policy text using; c) validate the framework's effectiveness.
Infrastructures	Software assisting qualitative analysis (Noldus The Observer) and analysis of the eyes' activity (SMI RED500 e Pupil Labs); institutional license to corpus management tools (eg. SketchEngine)
Skills and competencies for the development of the activity	Conversation analysis, linguistics, social psychology
Training offer	Text mining, Human computer interaction, Tools for online experiments, Python for non-computer scientists, Ethical, legal and socials effects of technology
Possible Secondments	Non-academic: **Expert.ai (supervisor: dr. Filippo Nardelli)** Expert.ai is a leading, award-winning company in artificial intelligence applied to text with more than 20 years of experience in natural language understanding. Its legal solutions enable augment legal experts' ability to read and understand thousands of regulatory documents (https://www.expert.ai/). Academic: **Department of Communication and Media, University of Liverpool (supervisor: dr. Elena Musi)** Dr Musi's current research interweaves Artificial Intelligence and Communication Sciences with particular focus on (mis)information and human-computer interaction (https://www.liverpool.ac.uk/communication-and-media/staff/elena-musi/).

3 Research Option Description

Doctoral Course	**Brain, Mind and Computer Science**
Department name	Department of General Psychology
Research topic	Neuroscience, technology, and society
Research option	Modulating brain oscillations with non-invasive brain stimulation
Supervisor	Gianluca Campana gianluca.campana@unipd.it
Webpage	https://www.dpg.unipd.it/en/gianluca-campana
Context of the research activity and objectives	Perceptual processing can be easily modulating by means of non-invasive brain stimulation, using transcranial magnetic or electrical stimulation. Recent research found that different frequencies of oscillation of our brain cells might facilitate or even induce different percepts, supporting the idea of a strong top-down modulation of our perceptual processing. This project aims to investigate the ways to induce (entrain) different brain oscillations in order to alter the thresholds for perceiving different visual patterns requiring global integration, or even for producing hallucinations of different perceptual patterns. Stimulation parameters for achieving the most reliable neural entrainment will also be investigated by means of resting-state EEG.
Infrastructures	Laboratories equipped with transcranial electrical and magnetic stimulation and for recording EEG.
Skills and competencies for the development of the activity	Preferential evaluation will be conferred to the programming skills and skills on EEG analysis.
Training offer	Training offer includes cognitive neuroscience, programming skills, human computer interactions, machine learning, internet of things, methods for experimental studies with humans, human and machine vision.
Possible Secondments	- Department of Psychology, University of Aberdeen. - Berenson-Allen Center for Noninvasive Brain Stimulation at the Beth Israel Deaconess Medical Center (USA) for 3 to 6 months.

4 Research Option Description

Doctoral Course	**Brain, Mind and Computer Science**
Department name	Department of General Psychology
Research topic	Neuroscience, technology, and society
Research option	Long term time restricted eating (TRE): metabolic, hormonal, neuronal, and cognitive effects
Supervisor	Supervisor: Antonio Paoli, MD (PI) antonio.paoli@unipd.it Tatiana Moro Ph.D., Giuseppe Marcolin, Ph.D.Andrea Casolo Ph.D.
Webpage	https://www.biomed.unipd.it/ricerca/aree-tematiche/physical-activity-and-health/health-sport-and-exercise-sciences
Context of the research activity and objectives	The objective of this project is to explore the role of Time Restricted Eating (TRE) dietic approach, which limits the whole daily energy intake in a confined window of time (8-12h), without reducing the usual quantity of food ingested, on metabolic and neuro-cognitive function in older adults. Our group and others have already demonstrated that TRE can reduce fat mass, improve insulin sensitivity, control inflammatory and other metabolic markers in healthy young adults. The positive effect of TRE seems to be linked to the induction of autophagy. Moreover, fasting can promote the release of BDNF which is a died neurotrophin with a positive role on cognition and in many other physiological functions such as neuroprotection, improving glucose metabolism, and stress resistance. The role of TRE on cognitive function in older adults is still uncovered.
Infrastructures	Nutrition and Exercise Lab (Department of Biomedical sciences): Body composition section (DEXA, ultrasound, bioelectrical impedance analysis), Muscle activation (High density EMG), Balance (force plates, motorized platform for dynamic balance), Metabolism (metabolic gas analyser), muscle performance (isometric testing chair, handgrip).
Skills and competencies for the development of the activity	Knowledge of basic of nutrition, metabolism and basic molecular laboratory skills
Training offer	The training includes the attendance of the courses offered by the Ph.D. Brain, Mind and Computer Science according to the didactic obligations of the same, described at the page: http://hit.psy.unipd.it/BMCS/teaching-offer It also provides, where possible, outside the BMCS offer, the attendance of seminars related to the themes of the project proposed by departments of the area (Department of Biomedical Sciences, Department of Information Engineering, Department of Medicine, and Department of General Psychology).
Possible Secondments	3 months at Immaculata De Vivo Lab – Department of Epidemiology, T.H. Chan School of Public Health, Harvard University.

	3 month at Gianluca Mech SpA, primary company in the field of ketogenic proprietary food and herbal products that has planned to implement a ketogenic – intermittent fasting approach.