

Nr.crt.	Titlu lucrare	Scurta descriere	Cerinte	Nivel (licenta/master)
1	Closed-loop control of physiological processes using advanced control solutions – in collaboration with Obuda University	Advanced control techniques, like linear parameter varying techniques, tensor product transformation based control, gain scheduling, linear matrix inequality based optimization should be applied on physiological problem for control purposes.	MATLAB, control engineering knowledge (medium), mathematics, English, high independency	MSc
2	Reinforcement learning based decision support system development focusing on physiological processes – in collaboration with Obuda University	Reinforcement learning based decision support systems is an emerging field in the reseach community (e.g. AlphaGO). The knowledge of experts can be described using knowledge libraries, but the expertise of professionals is hard to copied. The student should investigate already existing solutions and realize own implementation for cancer control purposes.	Python, web development knowledge (basics), Machine learning knowledge, English, high independency	MSc
3	Computer-aided system to guide the diagnosis, risk stratification and the management of thyroid cancer – in collaboration with “Iuliu Hatieganu” University of Medicine and Pharmacy	Computer-aided diagnosis system development, testing, validation, calibration.	Python, Machine learning knowledge, Image processing knowledge, English, high independency	MSc
4	Computer-aided system to	Computer-aided diagnosis	Python, Machine learning knowledge,	MSc

	guide the diagnosis, risk stratification and the management of heart diseases – in collaboration with “Iuliu Hatieganu” University of Medicine and Pharmacy	system development, testing, validation, calibration.	Image processing knowledge, English, high independency	
5	Tumor growth modelling - in collaboration with Obuda University	Classical mathematical models of tumor growth have shaped our understanding of cancer and have broad practical implications for treatment scheduling and dosage. However, improvement are still necessary on these models.	Matlab, English	MSc
6	Universality and 3[N] Model – in collaboration with AlphaBlock	Using Reinforcement Learning to achieve desired goals: a) Modelling a physical system/stocks; b) Definition of states and actions (to maximise return/efficient use of resources); c) Graph representation for learning status/progress	Basic knowledge of financial markets and portfolios. Previous experience in Python is preferred, but other programming languages such as MATLAB can also be used. Advanced knowledge of RL is required. English language skills and a high level of independence are required, as the student will be collaborating with an international research team!	MSc
7	Period 3 implies chaos? – in collaboration with AlphaBlock	Using action algorithms for contingencies in autonomous driving: partially observable Markov chains + multiple trajectory generation. The same idea can be applied in the financial domain: forecast a certain evolution of the situation and for the unexpected	Basic knowledge of financial markets and portfolios. Previous experience in Python is preferred, but other programming languages such as MATLAB can also be used. Advanced knowledge of AI & ML is required. English language skills and a high level of independence are required, as the student will be collaborating with an international research team!	Bsc/Msc

		<p>situations, when major changes in the evolution occur, have an algorithm to:</p> <p>a) Detect the presence of an unforeseen situation (large variations);</p> <p>b) Apply appropriate control (possibly with reinforcement learning/genetic algorithms based on historical data)</p>		
8	Markov Matrix - in collaboration with AlphaBlock	<p>a) Using deep learning to identify patterns in available data that humans cannot identify for control purposes;</p> <p>b) Finding the best data for maximum accuracy of the deep learning algorithm;</p> <p>c) Data normalization + deep learning: performance comparison against non-normalized data</p>	Basic knowledge of financial markets and portfolios. Previous experience in Python is preferred, but other programming languages such as MATLAB can also be used. Advanced knowledge of AI & ML is a plus! English language skills and a high level of independence are required, as the student will be collaborating with an international research team!	Bsc/Msc
9	Modelling and Optimization of Biochemical processes – in collaboration with University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca	Development of different mathematical model for antioxidant production from grape waste. Process optimization	Matlab, Identification methods, Modelling, artificial intelligence, Optimization, English, high independency	BSc
10	Advanced control (Fractional order control)	Design and implementation of advanced controllers for laboratory equipment	Matlab, Mathematics, Control Engineering	BSc

Ing. Alexandru BERCIU

1	Complexity and control through anticipation - in collaboration with AlphaBlock	The topic involves the use of fuzzy logic for clustering data and forecasting the evolution of portfolios, as well as the design of optimization algorithms to increase forecasting efficiency.	Basic knowledge of financial markets and portfolios. Previous experience in Python is preferred, but other programming languages such as MATLAB can also be used. English language skills and a high level of independence are required, as the student will be collaborating with an international research team!	BSc
2	Ising and 3[N] - in collaboration with AlphaBlock	Using a quantum neural network, the performance of portfolio evolution forecasting will be tested in comparison with classical forecasting methods.	Basic knowledge of financial markets and portfolios. Previous experience in Python is preferred, but other programming languages such as MATLAB can also be used. Advanced knowledge of quantum computing is an advantage! English language skills and a high level of independence are required, as the student will be collaborating with an international research team!	BSc/ MSc
3	Overcoming Granger's Challenge - in collaboration with AlphaBlock	The theme involves the use of advanced methods to aggregate stock market data in order to increase the income of investors in investment funds. Several such methods will be tested and benchmarked, applying also the optimal forecasting method.	Basic knowledge of financial markets and portfolios. Previous experience in Python is preferred, but other programming languages such as MATLAB can also be used. English language skills and a high level of independence are required, as the student will be collaborating with an international research team!	BSc/ MSc