

# Προτεινόμενα Θέματα Διπλωματικής Εργασίας

Από

Διδάσκοντα Χριστόφορο Ρεκατσίνα

## **A. Cost aware data generation utilizing Bayesian Optimization and active learning**

Abstract:

Data generation and/or acquisition in natural sciences and technology are often time consuming both computationally/numerically wise and in terms of designing and performing physical experimentation. The Scope of the present thesis is to develop an active learning algorithm based on Bayesian optimization in order to be able to propose of the best candidate point/points in the examined design space. An approach which will access the best candidate technique in terms of fidelity and cost as to define the next choice in the design space.

## **B. Physics/Knowledge informed machine learning**

Abstract:

Within the general perspective of accurate data generation in order to feed and train machine learning models the fidelity of the fed data is crucial. Following this need it is proposed the incorporation of physics and/or general knowledge of the domain expert in specific modules of the ML algorithms for improving the efficiency of the predictive model. To this end we propose a thesis were Physics Informed Neural Networks will be further developed for the solution of differential equations. The challenges vary from

- the choice of activation function,



ΤΜΗΜΑ ΨΗΦΙΑΚΩΝ  
ΣΥΣΤΗΜΑΤΩΝ



ΔΗΜΟΚΡΙΤΟΣ  
ΙΝΣΤΙΤΟΥΤΟ ΠΛΗΡΟΦΟΡΙΚΗΣ  
ΚΑΙ ΤΗΛΕΠΙΚΟΙΝΩΝΙΩΝ

- the choice and manipulation of distance function in order to enforce restrictions
- the scaling of specific input parameters related to the differential equation and finally
- the final form of the differential equation that “we” challenge the PINN to provide solution