



Allegato 1 - PARERE AVIO

Il giorno 12/09/2023 il coordinatore del Corso di Studio in Mechatronics Engineering invia ai rappresentanti di AVIO, nel contesto del nuovo piano di studio per la Laurea Magistrale in Mechatronics Engineering che sarà messo in attuazione dall'Anno Accademico 2024-2025 e del relativo profilo professionale che da esso deriva, il curriculum (o blocco) D, denominato "Computational Methods", presentato qui di seguito.

The new block D is conceived for eager students of Mechatronics Engineering who are willing to complete their knowledge by acquiring advanced mathematical skills and computing capabilities. The scope is to understand and solve complex physical problems while being educated in the most charming intellectual independence.

Besides a first advanced course in mathematical analysis addressing complements of complex variable theory and elements of distribution theory, the block provides a second course introducing the Python ecosystem for scientific computing along with a third course on data analysis and signal processing techniques for model fitting and parametric estimates or non-linear solving of inverse problems (such as image denoising, source separation, and PSF decomposition). The fourth course will finally provide a solid knowledge of the theoretical background behind the main Machine Learning (ML) algorithms from Neural Networks to Reinforcement Learning along with their application (by using the standard libraries in a Python environment) to open physical problems.

Such a block aims at preparing professionals who are able to deal with complex design and managing problems by using advanced mathematical tools, yet with an engineering attitude.

The professional opportunities involve R&D divisions in manufacturing or engineering companies that deal with complex computational problems or that anyway need advanced mathematical tools.

Il Blocco D è caratterizzato dai seguenti corsi:

- 1) MATHEMATICAL METHODS FOR PHYSICS FIS/02, 8 CFU I year/I sem
- 2) LABORATORY - CALCULUS [Magistrale Matematica] INF/01, 4 CFU II year/I sem
- 3) NUMERICAL METHODS FOR ASTROPHYSICS FIS/05, 6 CFU II year/I sem
- 4) MACHINE LEARNING METHODS FOR PHYSICS FIS/01, 6 CFU II year/II sem.



Il blocco D sopra presentato raccoglie generale interesse da parte della AVIO. Il profilo della figura professionale che ne consegue risulta compatibile con specifiche esigenze e richieste della AVIO, specialmente nel campo della modellistica matematica e dei problemi computazionali complessi.

Luca Bigarelli
AVIO TVAS Technical Responsible