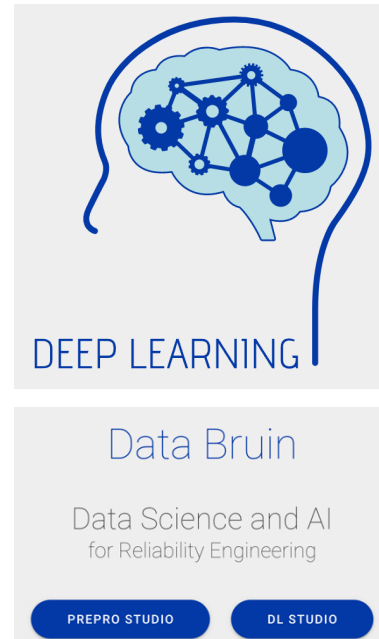


Hands-On Deep Learning for Reliability and Risk

This 10-hour course (in 5 days) offers a theoretical and hands-on introduction to Deep Learning for modeling and implementing solutions for risk and reliability of complex engineering systems. Given the rapid evolution of the artificial intelligence landscape, fueled by the global trend towards Industry 4.0, Deep Learning has become an inevitable part of reliability, predictive maintenance, safety, risk, and digital twin areas, as it encompasses the latest advances in artificial intelligence with important applications in assessing the health status of complex engineering systems using Big Machinery Data, i.e., massive and multidimensional data from multi-sensor networks, images, and text. During the course, we will discuss the theory behind Deep Learning techniques, understand how they work, build, and train models, and use them for health state diagnosis and prognosis as well as remaining useful life prediction of equipment and structures. Focus is placed on practice and problem-solving skills with case studies from fields such as Oil & Gas, Mining, and Nuclear Energy.



Topics of discussion include:

- Deep Learning in Risk and Reliability:
- Machine Learning Basics
- Deep Neural Networks
- Multi-Sensor Data Preprocessing Pipeline for Risk and Reliability
- Convolutional Neural Networks (CNNs)
- Recurrent Neural Networks (RNNs)

The course does not require previous knowledge in Python programming or any other language as attendees will have access to DataBruin (<https://databruin.com/>): an open access and web-based graphical programming environment for preprocessing of multi-sensor monitoring data and developing deep learning solutions. DataBruin provides an implementation of data flow diagrams in an intuitive visual drag-and-drop manner that not only offers a fast prototyping and code-free platform by helping practitioners to focus on the concepts rather than the syntax, but also provides the opportunity to guide them toward error-free prototyping of Deep Learning-based Risk and Reliability models. DataBruin provides standardization on the structure of deep learning projects by offering a comprehensive path from preparing datasets all through the predictions and necessary assessments, with the standard auto-generated Python code for each analysis step.

When? May 16th to 20th, from 4PM to 6PM PST

Who? Prof. Enrique López Droguett

Enrique López Droguett is Professor in the Civil & Environmental Engineering Department and the Garrick Institute for the Risk Sciences at the University of California, Los Angeles (UCLA), USA, and Associate Editor for both the Journal of Risk and Reliability, and the International Journal of Reliability and Safety. He also serves in the Board of Directors of the International Association for Probabilistic Safety Assessment and Management (IAPSAM). Prof. López Droguett conducts research on Bayesian inference and artificial intelligence supported digital twins and prognostics and health management based on physics informed deep learning for reliability, risk, and safety assessment of structural and mechanical systems. His most recent focus has been on quantum computing and quantum machine learning for developing solutions for risk and reliability quantification and energy efficiency of complex systems, particularly those involved in renewable energy production. He has led many major studies on these topics for a broad range of industries, including oil and gas, nuclear energy, defense, civil aviation, mining, renewable and hydro energy production, and distribution networks. López Droguett has authored more than 250 papers in archival journals and conference proceedings.