



Departamento de
Estadística e
Investigación Operativa

CICLO DE CONFERENCIAS ESTADÍSTICA Y CIENCIA DE DATOS PATRICIA ROMÁN

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Título: Understanding systems through the regression importance signature — a biological case study.

Fecha y hora: 5 de febrero del 2026 (9.30 horas).

Lugar: Seminario I del IMAG, UGR.

Conferenciante: Giulia Pisano.

Resumen:



The regression importance index of a coherent system evaluates a component's importance, taking into account the system's conditional mean lifetime when the component's failure time is known. The aim is to extend such importance measure to subgroups of components, introducing the "regression importance signature". This is a tool designed to identify, for any fixed number k of components, the subgroup of size k whose joint state most significantly influences system lifetime variability. Unlike traditional single-component indices, the importance signature captures heterogeneity and interactions, reducing them to intuitive behaviours in series or parallel systems and revealing subsystems or dependencies that cannot be detected by individual measures. In addition, we investigate new properties of the importance index that enhance understanding of how component reliability and structural role jointly affect the system. General results for dependent components are provided, as well as conditions for comparing individual components and subgroups, with a particular attention on system modules. Moreover, a biological application is provided to highlight the increasing use of reliability theory in areas such as aging, longevity, and ecosystem dynamics. This setting also illustrates how the regression importance signature extends beyond traditional engineering systems. The talk is based on a recent work with A. Di Crescenzo and A. Suárez-Llorens.

Breve reseña del conferenciante:

Giulia Pisano is PhD student in Probability and Statistics with a Master's degree in Mathematics, with current research focused on reliability theory, information measures, and stochastic orders.