

**DEPARTAMENTO DE INGENIERÍA ELÉCTRICA Y ELECTRÓNICA**

**NOMBRE DEL CURSO**

*Advanced Control Techniques:  
MFG and MPC\**

**PROFESOR INVITADO**

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## Advanced Control Techniques: MFG and MPC

The course will present techniques based on game theory and optimization. Mean field games (MFG) appear in different domains such as economics, physics, biology and engineering. The students will understand how the Hamilton-Jacobi-Bellman (HJB) and the Fokker-Plank-Kolmogorov (FPK) equations lead to the development of strategies that are applied to problems in multi-agent systems with large but finite populations. On the other hand, even though the three-terms controller (PID) is the strategy that is used in most of the industrial framework nowadays, MPC techniques are gaining some momentum, especially into the Industry 4.0 area. In both techniques, the students will gain some insights about particular key features regarding the use of those control methodologies, as well as their convenient application to some engineering case studies.

In particular and related to the MPC module of the course, the students will be able to determine the limits of the predictive control designs, finding possible solutions and alternative strategies for overcome them. Moreover, they will also be able to identify the relation between nature of the real system and the family of MPC controllers suitable to be used with the given system. Finally, the students will be able to recognize concepts and basic tools for the statement of MPC problems taking into account different types of models such as of nonlinear and hybrid nature.

\*Curso dictado en inglés

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