PhD in Chemical Sciences
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PhD Seminar

"Asymmetric catalysis with BINOL-derivatives: Application in Organic Synthesis"

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Enantioselective organocatalysis is experiencing very strong development today, as demonstrated by the attribution of the 2021 Nobel Prize in Chemistry to Benjamin List and David MacMillan. More in general, stereoselective synthesis responds to a need for the development of processes that are chemo-, regio- and stereo-selective, related to the challenges associated with the sustainable production of **fine chemicals**, **pharmaceuticals** and even **materials**. In this regard, the utility of BINOL-derivatives will be illustrated and particular attention will be payed to the synthesis of tetrahydropyrans and piperidines, skeletons occurring in natural products and biologically relevant compounds, *via* Prins processes. Another privileged structure is represented by isatin, since its 3-substituted-3-hydroxyoxindoles derivatives are widely found in natural products and pharmacologically active products. The catalytic enantioselective formation of carbon quaternary stereogenic centers from isatins derivatives through allylboration reaction, and the total synthesis of (*R*)-Chimonamidine natural product will be shown. Finally, a family of novel chiral BINOL-derived phosphotriesters will be shown, together with their application in transition metal catalysis and in the conception of complexes combining magnetic, luminescent and chiral properties.