UNIVERSITÀ DEGLI STUDI DI TORINO

ID

VP03_DIP_CHIM

Visiting Professor Program
Academic year 2020/2021

DEPARTMENT OF CHEMISTRY

TEACHING COMMITMENT: 30 hours

COURSE TITLE

Organometallic Catalysis

TEACHING PERIOD

1st term

SCIENTIFIC AREA

Chemical Sciences

LANGUAGE USED TO TEACH

English

COURSE SUMMARY

The course is designed to offer the tools on how to study the mechanism of a catalytic reaction, presenting both traditional and more recent methods and their application the most appropriate approach for the determination of structural and kinetic parameters.

The border between homogeneous and heterogeneous catalysis will be outlined.

In addition, the course will show an overview of the better known and understood processes for the formation of carbon-carbon bonds and carbon-heteroatom bonds, employing organometallic compounds, by means of a presentation of diverse organic transformations catalysed by platinum-group transition

metals. Indications for developing a catalytic reaction, dealing with the control of the process variables, will also be provided.

LEARNING OBJECTIVES

At the end of the course, the students will learn the means for studying the mechanism of a catalytic reaction, employing traditional and recent methods and they will be able to choose the most appropriate approach for the determination of structural and kinetic parameters. They will be able to distinguish between homogeneous and heterogeneous catalytic processes in apparently homogeneous or heterogeneous reactions.

In addition, the students will be able to independently design new synthetic routes best suited for the formation of carbon-carbon bonds and carbon-heteroatom (i.e. N, O, S) bonds, employing platinum-group transition metals (e.g. Pd, Ru, Rh) as catalysts. They will also learn how to recognize the crucial variables in the design and development of a catalytic process.

TUTORSHIP ACTIVITIES (IF APPLICABLE)

LAB ACTIVITIES (IF APPLICABLE)

ADDITIONAL COURSE

COURSE TITLE

Elements of Process Development in the Pharmaceutical Industry

TEACHING PERIOD

2nd term

SCIENTIFIC AREA

Chemical Sciences

LANGUAGE USED TO TEACH

English

COURSE SUMMARY

Introduction to the pharmaceutical industry: history and current problems.

Basic regulatory concepts. What is an API (active pharmaceutical ingredient). Types of files, content, ICH guidelines on API purity. Elements of IP (intellectual property).

Various strategies for the development of a pharmaceutical process. Choice of synthesis and efficiency indicators. Selection of solvents and reagents. In-process controls and pharmaceutical analytical technology (PAT). Green chemistry, sustainability.

Solid state science: how crystallization develops. Polymorphism and analytical methods for the solid state.

Examples of problems in the development of industrial processes.

LEARNING OBJECTIVES

At the end of the course, the students will know the basic regulatory concepts and the ICH guidelines for the synthesis of an API (active pharmaceutical ingredient), the fundamentals of intellectual property and how to deal with the different strategies for the development of a pharmaceutical process. The students will also learn the fundamentals of solid-state science, especially as far as concerns crystallization, polymorphism and related analytical methods. In addition, the students should be able to identify the different issues that could be encountered within the development of an industrial process.

TUTORSHIP ACTIVITIES (IF APPLICABLE)

LAB ACTIVITIES (IF APPLICABLE)

OTHER ACTIVITIES BESIDES THE COURSE

VISITING PROFESSOR PROFILE

He/She studied organic chemistry at university and received his/her BS/MS degree. He/She further studied within the academia and obtained his/her PhD in Chemical Sciences. After a postdoctoral research period, he/she started to work for a global pharmaceutical company within the Chemical Development group. He/she had a professional experience in an anticancer research group. He/She has joined other multinational pharmaceutical companies as Senior Director of their Chemical Development groups, studying homogeneous catalytic processes, successfully applied to the synthesis of pharma molecule. He/She has co-authored over 120 peer-reviewed publications (h-index=42), several books, book chapters and he/she is the inventor of over 20 patents. He/She co-founded an international school of process development chemistry that holds short courses yearly. He/She is currently involved in the world of pharma industry, advising on process chemistry problems.

CONTACT PERSON AT THE DEPARTMENT

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