

Información del Plan Docente**Academic Year** 2017/18**Faculty / School****Degree****ECTS** 24.0**Year** ---**Semester** Annual**Subject Type****Module** ---**1.General information****1.1.Introduction**

The Master promotes the initiation into chemical research in the frontier of the scientific knowledge, in the areas of Molecular Chemistry and Catalysis, by means of undertaking the *Master's Degree Final Project* in research groups of recognized international prestige. The development of a research project, of whose experimental execution the student will be responsible directly, in a high-quality multidisciplinary research background provides an incomparable environment for the creation, development and transmission of scientific and technological knowledge. In addition, the utilization of advanced scientific instrumentation in the practical classes and Master's Final Project is an added value in order to find a qualified employment.

The *Master's Final Project* comprises the development of an original research project on a topic related to the Master's contents in one of the research groups of the ISQCH (Institute of Chemical Synthesis and Homogeneous Catalysis), the ICMA (Institute of Science of Materials of Aragon), and other public or private research centers related to the subject of the Master.

1.2.Recommendations to take this course

Knowledge and compliance of the standard safety regulations applicable to a research laboratory are required.

Motivation, responsibility, curiosity, creativity and team-working skills will be appreciated.

1.3.Context and importance of this course in the degree

The obligatory module *Master's Degree Final Project* (24 ECTS) encompasses the development of an original research project on a topic related to the Master's contents in one of the research groups of the ISQCH (Institute of Chemical Synthesis and Homogeneous Catalysis), the ICMA (Institute of Science of Materials of Aragon), and other public or private research centers related to the subject of the Master.

The elaboration and public defense of the *Master's Final Project* is of paramount importance in the Master program since it allows both the integration and the practical application of the knowledge acquired in the rest of subjects of the Master. In addition, this module allows for the development of general and transversal key competences of the Master.

1.4. Activities and key dates

The *Master's Degree Final Project* (TFM) will be developed along the whole academic year. However, due to the major workload in the first semester it will be carried out intensively along the second one. The presentation and defense of Master Final Project will take place in the dates that will be opportunely announced well in advance at the websites of the Sciences Faculty, <https://ciencias.unizar.es/master-en-quimica-molecular-y-catalisis-homogenea-2014-15>, and the Master, <http://masterqmch.unizar.es>.

2. Learning goals

2.1. Learning goals

To be able of developing a research project in Inorganic Chemistry, Organometallic Chemistry, Organic Chemistry or Catalysis, as an extension of the knowledge and competences acquired along the Master.

To apply the scientific methodology for developing an original research project including: bibliographic search; design, planning and development of experiments and data analysis and the drawing of conclusions.

To know, to analyze and to use critically the bibliography resources related to the research topic.

To apply the experimental and instrumental techniques in the area of Molecular Chemistry and Catalysis.

Aptitude to elaborate a descriptive report of the research results.

Ability to communicate and to debate with scientific rigor the research results.

2.2. Importance of learning goals

The *Master's Degree Final Project* makes possible the integration of the competences and skills acquired along the course, and allows putting into practice the knowledge and capacities acquired by the students during the development of the educational program of the Master.

The contents and competences of the Master, materialized in the accomplishment of the *Master's Final Project*, guarantee the acquisition of the specialized formation required for a Doctorate Program. In addition, the Master provides a suitable formation for researchers and technical staff of I+D+i public and private institutions, and of chemical companies of fine chemistry, materials and energy sectors.

3. Aims of the course and competences

3.1. Aims of the course

The *Master in Molecular Chemistry and Homogeneous Catalysis* aims to enable students the acquisition of knowledge and skills that allow their incorporation in different research fields both in public and private research centers, as well as in chemical companies.

The *Master's Degree Final Project* constitutes the culmination of the learning process of the Master. The aim of this module is to apply directly the acquired knowledge to the development of an original research project on a topic related to the Master's contents.

3.2.Competences

To integrate and evaluate research results in Molecular Chemistry and Catalysis, as well as to interpret them in a critical way and to relate them to theoretical knowledge.

To develop and apply ideas, in a research context, so that original contributions in Molecular Chemistry and Catalysis transferable to the social environment could be realized.

To plan and execute experiments in an independent way, and to be self-critical in the evaluation of both the experimental procedures and research results.

To apply protocols, procedures and advanced experimental techniques of synthesis and catalysis.

To select and use in an autonomous way different instrumental and structural characterization techniques, including the utilization of advanced equipment, and the interpretation and validation of the obtained results.

To transmit the results and conclusions of a research project in oral, written or graphical form, using suitable presentation tools.

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

In the evaluation of the *Master's Degree Final Project* the following aspects will be considered:

Written Memory of the work (60 %).

Presentation and defense (30 %).

Report of the supervisor (10 %).

In the written Memory the scientific content of the work, as well as the capacity of analysis and synthesis demonstrated by the student during the accomplishment of the work and the editing of the Memory, will be evaluated. Along the presentation and defense of the work, the clarity of the presentation and the capacity of the student will be assessed. Additionally, the supervisor's report on the development of the work will be also considered.

In the elaboration and management of the Master's Degree Final Project, the *Regulations from the University of Zaragoza*, the *Sciences Faculty Regulations* and the *Specific Regulations* from the Comisión de Garantía de la Calidad of the Master, must be taken into consideration (<https://ciencias.unizar.es/master-en-quimica-molecular-y-catalisis-homogenea-2014-15>).

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The designed learning process for the *Master's Dissertation* has an applied character and allows developing a great

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number of competences from the knowledge acquired in the rest of the Master's courses. The dissertation will be carried out in the research laboratories of the Master's participant groups. The projects will be supervised by permanent researchers from the University of Zaragoza and the Spanish Research Council (CSIC), or associate researchers who are also holders of a Doctoral qualification from both institutions.

At the beginning of the academic year, the *Comisión de Garantía de la Calidad* will assign the students the research projects, the supervisor and a tutor if required. The followed criteria will take into account, as far as possible, the preferences stated by the students.

The results of the research project will be presented in a written report, which will be defended publicly before a Committee.

5.2.Learning tasks

The *Master's Dissertation* (24 ECTS) takes the form of a work of initiation into chemical research that will be supervised by a researcher from one of the participant groups in the Master's, as well as in other public or private research centers related to the Master's courses.

5.3.Syllabus

The development of the course *Master's Degree Final Project* involves:

- An exhaustive bibliographic search.
- Design, planning and development of experiments.
- Evaluation of the results by means of the use of structural characterization techniques.
- Elaboration of a descriptive report with scientist format (report) of the research results.
- Public presentation and defense of the research work.

5.4.Course planning and calendar

The *Master's Dissertation* will follow a mutually agreed schedule between the supervisor and the student, taking into account the timetable of other courses and the safety regulations applicable to a research laboratory, up to completing a minimum dedication equivalent to 24 ECTS.

The supervisor of the dissertation will provide the student with the material required for the development of the research project. The student, in a supervised way, will carry out autonomously the search for general and specific bibliography on the research project's topic.

The dates for the presentation and defense of the dissertation will be published in advance on the bulletin board, and on the websites of the Faculty of Science

<https://ciencias.unizar.es/master-en-quimica-molecular-y-catalisis-homogenea-2014-15> and the Master's <http://masterqmch.unizar.es>.

5.5.Bibliography and recommended resources

URLs LIST:

Reception manual on risk prevention. Safety regulations in Chemistry laboratories. Elena Atrián Blasco, Vanesa Fernández Moreira. Instituto de Síntesis Química y Catálisis Homogénea, 2013.
<http://82.223.223.103:8080/CEQMA/download/ManualAcogidaISQCH.pdf?id=listadoDocumentos>

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How to prepare, tutor and evaluate a master's degree thesis. Rodríguez, M. L.; Llanes, J. (Eds.). (2013). Barcelona; Agència per a la Qualitat del Sistema Universitari de Catalunya. http://www.agu.cat/doc/doc_18533565_1.pdf