VNIVERSITAT DE VALÈNCIA

Course Guide
36472 Trabajo de Fin de Grado en Química

COURSE DATA

Data Subject	
Code	36472
Name	Trabajo de Fin de Grado en Química
Cycle	Grade
ECTS Credits	12.0
Academic year	2019 - 2020

Study (s)

Degree	Center	Acad. year	Period
1110 - Degree in Chemistry	Faculty of Chemistry	4	Second term

Subject-matter

Degree	Subject-matter	Character
1110 - Degree in Chemistry	19 - Degree Final project	End Labour Studies

Coordination

Name	Department
ARMENTA ESTRELA, SERGIO	310 - Analytical Chemistry
PORCAR I BOIX, IOLANDA	315 - Physical Chemistry

SUMMARY

The Bachelor Thesis (TFG) is a compulsory subject worth 12 credits that is programmed to be studiedin the 8th semester (year 4) of the Degree in Chemistry. Its target is to make it possible for students toapply the knowledge acquired throughout the degree course by means of carrying out technical work ora fundamental or applied research project that is related to some of the multiple fields in chemistry. Thatis why the project is to be conducted in the final stage of the curriculum and is focused on assessing thecompetences associated with the degree (as included in the Verifica document).

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

1110 - Degree in Chemistry :

R4-OBLIGATION TO HAVE SUCCESSFULLY COMPLETED THE COURSE

34183 - General Chemistry I

34184 - General Chemistry II

34185 - Chemistry laboratory I

34186 - Chemistry laboratory II

34187 - Mathematics I

34188 - Mathematics II

34189 - Physics I

34190 - Physics II

34191 - Biology

34192 - Informatics for Chemistry

34193 - Physical Chemistry I

34196 - Physical Chemistry Laboratory I

34199 - Inorganic Chemistry II

34201 - Inorganic Chemistry Laboratory I

34229 - Analytical Chemistry II

34231 - Analytical Chemistry Laboratory I

36450 - Analytical Chemistry I

36452 - Inorganic Chemistry I

36453 - Organic Chemistry I

36454 - Organic Chemistry II

36455 - Organic Chemistry Laboratory I

Other requirements

To be allowed to take this subject the student must have successfully completed all the subjects of 1st and 2nd year and have passed at least 150 ECTS credits corresponding to basic and compulsory subject areas. Additionally, the student must enrol in all the credits pending completion to finish the degree. The bachelor thesis will be assessed once the student complies with the requirements established in the TFG explanatory document.

COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

1110 - Degree in Chemistry

- Develop capacity for analysis, synthesis and critical thinking.
- Show inductive and deductive reasoning ability.
- Demonstrate leadership and management skills, entrepreneurship, initiative, creativity, organization, planning, control, leadership, decision making and negotiation.
- Solve problems effectively.
- Demonstrate ability to work in teams both in interdisciplinary teams and in an international context.
- Demonstrate ability to communicate information, ideas, problems and solutions to both specialist and non-specialist audiences and using information technology, as appropriate.
- Demonstrate a commitment to ethics, equality values and social responsibility as a citizen and as a professional.
- Learn autonomously.
- Demonstrate the ability to adapt to new situations.
- Acquire a permanent sensitivity to quality, the environment, sustainable development and the prevention of occupational hazards.
- Demonstrate knowledge and understanding of essential facts, concepts, principles and theories related to the areas of chemistry.
- Recognise and analyse new problems and plan strategies to solve them.
- Evaluate, interpret and synthesise chemical data and information.
- Handle chemicals safely.
- Handle the instrumentation used in the different areas of chemistry.
- Interpret data from observations and measurements in the laboratory in terms of their significance and the theories that underpin them.
- Evaluate the risks in the use of chemicals and laboratory procedures.
- Relate theory and experimentation.
- Recognise and evaluate chemical processes in daily life.
- Develop sustainable and environmentally friendly methods.
- Relate chemistry with other disciplines.
- Students must have the ability to gather and interpret relevant data (usually in their field of study) to make judgements that take relevant social, scientific or ethical issues into consideration.
- Students must be able to communicate information, ideas, problems and solutions to both expert and lay audiences.

- Students must have developed the learning skills needed to undertake further study with a high degree of autonomy.
- Express oneself correctly, both orally and in writing, in any of the official languages of the Valencian Community.
- Have basic skills in the use of information and communication technology and properly manage the information obtained.

LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

The previous section includes the competences contained in the document VERIFICA. This subject addresses part of the learning results of the matter The Bachelor Thesis in Chemistry that allow to acquire specific knowledge of chemistry, cognitive skills and general skills recommended by the EUROPEAN CHEMISTRY THEMATIC NETWORK (ECTN) for the Chemistry Eurobachelor® Label. The following table lists the learning outcomes acquired in the subject The Bachelor Thesis in Chemistry related to the competences of the degree in Chemistry.

COMPETENCES AND COGNITIVE SKILLS	
The learning process should allow the degree graduates to demonstrate:	
	Competences of the subject The Bachelor Thesis in Chemistry that contemplate the learning outcomes EUROBACHELOR®
Ability to demonstrate knowledge and understanding of the facts, concepts, principles and fundamental theories related to the topics mentioned above.	Demonstrate knowledge and understanding of essential facts, concepts, principles and theories related to the areas of chemistry..(CE13).
Ability to apply this knowledge and understanding to the solution of common qualitative and quantitative problems.	Solve qualitative and quantitative problems following previously developed models..(CE14). Recognise and analyse new problems and plan

	strategies to solve them..(CE15). Understand the qualitative and quantitative aspects of chemical problems..(CE24).
Competences for the evaluation, interpretation and synthesis of information and chemical data.	Evaluate, interpret and synthesise chemical data and information..(CE16). Interpret data from observations and measurements in the laboratory in terms of their significance and the theories that underpin them..(CE20).
Ability to recognize and implement science and the practice of measurement.	Show knowledge of the metrology of chemical processes including quality management..(CE10) Interpret data from observations and measurements in the laboratory in terms of their significance and the theories that underpin them..(CE20).
Competences to present and argue scientific issues orally and in writing to a specialized audience.	Relate chemistry with other disciplines.(CE26). Prepare reports, surveys and industrial and environmental projects in the field of chemistry..(CE27). Demonstrate ability to

	communicate information, ideas, problems and solutions to both specialist and non-specialist audiences and using information technology, as appropriate. (CG6). Students must be able to communicate information, ideas, problems and solutions to both expert and lay audiences..(CB4).
Ability to calculate and process data, related to information and chemistry data.	Solve qualitative and quantitative problems following previously developed models..(CE14). Recognise and analyse new problems and plan strategies to solve them..(CE15).
COMPETENCES AND COGNITIVE SKILLS RELATED TO THE PRACTICE OF CHEMISTRY	
The learning process should allow the degree graduates to demonstrate:	
	Competences of the subject The Bachelor Thesis in Chemistry that contemplate the learning outcomes EUROBACHELOR®
Capacities to handle chemical products safely, taking into account their physical and chemical properties, including any risk associated with their use.	Handle chemicals safely..(CE17). Evaluate the risks in the

	use of chemicals and laboratory procedures..(CE21).
Capabilities necessary to perform standard laboratory procedures as well as to use instrumentation in synthetic and analytical works, in both cases in relation to both organic and inorganic systems.	Carry out standard experimental procedures involved in synthetic and analytical work, in relation to organic and inorganic systems..(CE18). Relate theory and experimentation..(CE22). Understand the qualitative and quantitative aspects of chemical problems..(CE24).
Capacities to monitor, observe and measure the chemical properties, facts or changes, and perform their registration (collection) and documentation in a systematic and reliable way.	Handle the instrumentation used in the different areas of chemistry.(CE19). Relate theory and experimentation..(CE22). Recognise and evaluate chemical processes in daily life..(CE23). Understand the qualitative and quantitative aspects of chemical problems..(CE24).
Ability to interpret data derived from observations and laboratory measurements in terms of their relevance, and relate them to the appropriate theory.	Interpret data from observations and measurements in the laboratory in terms of their significance and the theories that underpin

	them..(CE20). Relate theory and experimentation..(CE22). Recognise and evaluate chemical processes in daily life..(CE23). Understand the qualitative and quantitative aspects of chemical problems..(CE24). Relate chemistry with other disciplines.(CE26).
Ability to perform risk assessments of the use of chemical substances and laboratory procedures.	Understand the qualitative and quantitative aspects of chemical problems..(CE24). Develop sustainable and environmentally friendly methods (CE25). Evaluate the risks in the use of chemicals and laboratory procedures (CE21).
GENERAL COMPETENCES	
The learning process should allow the degree graduates to demonstrate:	
	Competences of the subject The Bachelor Thesis in Chemistry that contemplate the learning outcomes EUROBACHELOR®

Ability to apply practical knowledge to solve problems related to qualitative and quantitative information.	Solve problems effectively..(CG4). Solve qualitative and quantitative problems following previously developed models..(CE14). Relate theory and experimentation..(CE22). Recognise and evaluate chemical processes in daily life..(CE23). Understand the qualitative and quantitative aspects of chemical problems..(CE24).
Calculation and arithmetic capabilities, including aspects such as analysis error, estimates of orders of magnitude, and correct use of the units.	Develop capacity for analysis, synthesis and critical thinking.. (CG1). Show inductive and deductive reasoning ability..(CG2). Solve problems effectively..CG4).
Competences in information management, in relation to primary and secondary sources, including information retrieval through on-line searches.	Demonstrate ability to communicate information, ideas, problems and solutions to both specialist and non-specialist audiences and using information technology, as appropriate..(CG6). Have basic skills in the use of information and communication

	technology and properly manage the information obtained.(CT2).
Ability to analyse materials and synthesize concepts.	Develop capacity for analysis, synthesis and critical thinking.. (CG1). Show inductive and deductive reasoning ability..(CG2). Students must have the ability to gather and interpret relevant data (usually in their field of study) to make judgements that take relevant social, scientific or ethical issues into consideration..(CB3).
Ability to adapt to new situations and make decisions.	Demonstrate the ability to adapt to new situations..(CG9). Recognise and analyse new problems and plan strategies to solve them..(CE15). Students must have the ability to gather and interpret relevant data (usually in their field of study) to make judgements that take relevant social, scientific or ethical issues into consideration..(CB3).
Skills related to information technology such as word processing, spreadsheet, recording and storage of data, internet use related to the subjects.	Demonstrate ability to communicate information, ideas, problems and solutions

	to both specialist and non-specialist audiences and using information technology, as appropriate..(CG6). Have basic skills in the use of information and communication technology and properly manage the information obtained.(CT2).
Planning and time management skills.	Develop capacity for analysis, synthesis and critical thinking. (CG1). Demonstrate leadership and management skills, entrepreneurship, initiative, creativity, organization, planning, control, leadership, decision making and negotiation..(CG3). Solve problems effectively..CG4).
Interpersonal skills to interact with other people and get involved in team work.	Demonstrate ability to work in teams both in interdisciplinary teams and in an international context..(CG5). Demonstrate a commitment to ethics, equality values and social responsibility as a citizen and as a professional. (CG7). Demonstrate the ability to adapt to new situations..(CG9).

Competences in oral and written communication, in one of the main European languages, in addition to the language of the country of origin.	Demonstrate ability to work in teams both in interdisciplinary teams and in an international context..(CG5). Demonstrate a commitment to ethics, equality values and social responsibility as a citizen and as a professional. (CG7). Express oneself correctly, both orally and in writing, in any of the official languages of the Valencian Community. (CT1). Students must be able to communicate information, ideas, problems and solutions to both expert and lay audiences..(CB4). Have basic skills in the use of information and communication technology and properly manage the information obtained.(CT2).
Study skills necessary for professional development. These will include the ability to work autonomously.	Demonstrate leadership and management skills, entrepreneurship, initiative, creativity, organization, planning, control, leadership, decision making and negotiation..(CG3). Demonstrate ability to work in teams both in interdisciplinary teams and in an international

	context..(CG5). Learn autonomously.(CG8). Demonstrate the ability to adapt to new situations..(CG9). Students must have developed the learning skills needed to undertake further study with a high degree of autonomy.(CB5).
Ethical commitment to the European Code of Conduct: http://ec.europa.eu/research/participants/data/ref/h2020/other/hi/h2020-ethics_code-of-conduct_en.pdf	Acquire a permanent sensitivity to quality, the environment, sustainable development and the prevention of occupational hazards.(CG10). Demonstrate a commitment to ethics, equality values and social responsibility as a citizen and as a professional. (CG7). Students must have the ability to gather and interpret relevant data (usually in their field of study) to make judgements that take relevant social, scientific or ethical issues into consideration. (CB3).

Upon completion of the TFG, students must:

• Demonstrate capacity for analysis and synthesis.

• Demonstrate inductive and deductive ability.

• Demonstrate capacity for organisation and planning.

• Make decisions with rigour.

• Demonstrate skills in interpersonal relations from a gender perspective.

• Work in a team with a responsible and professional behaviour and from a gender perspective.

• Demonstrate ability to apply their knowledge creatively to solve a real chemical problem.

•Demonstrate ability to structure a solid defence of personal points of view based on well-founded scientific knowledge.

• Demonstrate skills to prepare complex, well-structured and well-written scientific reports.

• Demonstrate skill in the oral presentation of a project, using the most common audiovisual media.

• Be aware of the ethical component and of the ethical principles of professional practice.

• Demonstrate autonomous learning and capacity for initiative.

• Reason critically.

• Demonstrate ability in information management.

• Show adaptation to new situations.

• Demonstrate motivation for quality.

• Demonstrate sensitivity to environmental issues.

• Recognise and analyse new problems and plan strategies to solve them.

• Demonstrate ability to relate theory and experimentation.

• Recognise and evaluate the chemical processes in daily life.

• Demonstrate ability to link chemistry with other disciplines.

• Handle the chemical instrumentation employed in the different areas of chemistry; assess the risks of the use of chemical substances and procedures, and develop sustainable and environmentally friendly methodologies.

Finally,

• Demonstrate an ethical and responsible conduct in the exercise of their professional work, values that are transmitted by teachers and researchers of the University, as a generator and transmitter of scientific knowledge.

DESCRIPTION OF CONTENTS

1. Internal experimental and/or theoretical work.

The TFG is an autonomous and individual assignment that every student must perform under the supervision of an academic tutor. The experimental and/or theoretical works related to the qualification will be carried out in Departments, Laboratories or Research Centers of the University of Valencia.

2. Literature research and review.

The TFG is an autonomous and individual assignment that every student must perform under the supervision of an academic tutor. Literature research and reviews will focus on different topics related to the degree programme.

3. Works of a theoretical nature.

The TFG is an autonomous and individual assignment that every student must perform under the supervision of an academic tutor. Works of a theoretical nature where the student proposes all the phases of development of a hypothetical research project related to the Degree.

4. Work based on interships.

The TFG is an autonomous and individual assignment that every student must perform under the supervision of an academic tutor. Internships will be carried out in companies, organisations or institutions other than the University of Valencia, as long as an agreement has been signed.

WORKLOAD

ACTIVITY	Hours	% To be attended
Graduation project		100
Development of individual work	49,00	0
Readings supplementary material	40,00	0
Realización del Trabajo Fin de Grado	210,00	0
Presentación y defensa del Trabajo Fin de Grado	1,00	0
TOTAL	**300,00**	

TEACHING METHODOLOGY

The TFG must be prepared individually by every student under the supervision of an academic tutor. There are four possible options for conducting the TFG:

a) Experimental and/or Theoretical works related to the qualification that can be carried out in Departments, Laboratories or Research Centres at the University of Valencia.

b) Literature research and reviews based on different topics related to the degree programme.

c) Works of a theoretical nature where the student proposes all the phases of development of a hypothetical research project related to the Degree.

d) Works based on internships, carried out in companies, organisations or institutions other than the University of Valencia, as long as an agreement has been signed. In these cases, the Committee for TFG shall appoint an academic tutor.

All the students must submit a report of their work, regardless of the type of bachelor's thesis they conduct, and they must defend it in a public meeting.

The report must be between 20 and 30 pages long excluding bibliography, font size 12, line spacing to 1.15, and margins of 2.5 cm. NO ANNEX IS ALLOWED. It can be written in any of two official languages of the University or in English. For the cover, the general model (annex VIa) will be used and the content will be structured in the following sections:

- Summary (in two of the languages possible)
- Index
- Introduction
- Aims
- Experimental part
- Results and discussion
- Conclusions
- Bibliography (following the format set out in annex VIb)

The oral defence of the TFG will be conducted by students in person and in an open session. The presentation will last a maximum of 15 minutes during which the student will have to make a summary of the report submitted. Next, the panel will ask questions and/or clarifications as deemed appropriate, for a maximum of 15 minutes.

Students in mobility programmes may carry out the TFG at the host university (agreement of the Academic Committee of 5 November 2014).

Students from other universities enrolled in the degree as mobility students may carry out the TFG at the University of Valencia under the same conditions as UV students, as long as their exchange agreement allows them to. Students can choose a topic and a tutor from the offer available at the time that they join the University of Valencia.

EVALUATION

The academic committee for the TFG will annually appoint, at the suggestion of the departments, the examining panels for the different areas of knowledge assigned to the Faculty of Chemistry. The panel is constituted by three lecturers (two from the relevant area of knowledge and an external one). In no case can the tutor of a TFG be part of the panel responsible for its assessment.

The oral defence of the TFG will be conducted by students in person and in an open session. Next, the panel will ask questions and/or clarifications as deemed appropriate.

The panel will assess the report submitted (30%), the oral presentation (35%) and the defence (35%), according to the template attached.

The panel will sign a record to announce the agreements reached as regards the final mark assigned to each student. This final mark is calculated as the average between the mark awarded by the tutor (40%) and by the examination panel (60%). The panel may meet with the tutor, if needed, in order to solve any discrepancies that could arise. The panel will also propose the award of distinctions.

The minimum mark of the two parts (tutor and panel) has to be able to overcome the 5.0 unfulfilled.

Final marks awarded will be made public officially in a single record signed by the president and by an additional member of the Committee for TFGs.

Students may appeal against the final mark awarded through the procedure established in the relevant University of Valencia regulations.

REFERENCES

Basic

- Reglament del treball fi de grau aprovat pel Consell de Govern en sessió ordinaria del 20 de desembre de 2011. http://www.uv.es/quimdocs/graus/treball_fi_grau/reglament.pdf
- Pàgina web de la Facultat de Química: http://www.uv.es/quimica (pestanya Graus / TFG)
- Compromiso ético con el Código Europeo de conducta http://ec.europa.eu/research/participants/data/ref/h2020/other/hi/h2020-ethics_code-of-conduct_en.pdf

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

NORMATIVA DEFENSA TFG A TRAVÉS DE VIDEOCONFERENCIA

Se deberá utilizar Blackboard Collaborate, de uso habitual entre la comunidad universitaria y que da la posibilidad de proporcionar un link para el acceso a la videoconferencia de cualquier persona interesada. Este enlace del Servicio de Informática ofrece información sobre diferentes plataformas.

https://angela.uv.es/display/STU/%28VA%29+VIDEOTUTORIALS+-+Blackboard+Collaborate

Asimismo, el presidente de la comisión de TFG enviará a cada uno de los miembros de los tribunales y los estudiantes la información para acceder a la sesión de la videoconferencia, que debe tener carácter público y no requiere de contraseña. En la comunidad 2019-20 Grado de Química V2-2018 ALUMNOS CUARTO del aula virtual se creará una actividad "videoconferencia" con una sesión para cada uno de los tribunales y de los estudiantes que van a actuar.

Una vez recibida la comunicación por parte del presidente de la comisión de TFG con la fecha y la hora de la defensa a través de videoconferencia, si algún miembro del tribunal o algún estudiante no dispone de los medios tecnológicos necesarios para realizar la videoconferencia y / o tiene cualquier duda relativa a su funcionamiento puede enviar un correo a la dirección electrónica sergio.armenta@uv.es

Si durante la videoconferencia hubiera problemas técnicos ajenos al estudiante y no se pudiera realizar con éxito la videoconferencia, esta se repetiría en 24h, o en el momento que decidieron tribunal y estudiante.

Desarrollo del acto de defensa del TFG a través de videoconferencia:

El presidente de la comisión de TFG citará a los miembros de los diferentes tribunales y los estudiantes al menos 10 minutos antes de la hora de comienzo establecida, para asegurar la correcta conexión de todos los participantes. Asimismo, el presidente / a del tribunal comprobará la identidad del estudiante que va a realizar la defensa del TFG que deberá enseñar el DNI.

El acto de defensa del TFG constará de dos partes, que se realizarán en la misma sesión telemática. La primera parte consiste en la exposición del TFG por parte del estudiante. Esta parte debe tener una duración máxima de quince minutos. A continuación, el tribunal puede hacer las preguntas o aclaraciones que considere oportunos, con una duración máxima de quince minutos.

Una vez finalizada la defensa de todos los estudiantes, se procederá a realizar las calificaciones de los TFGs, en una segunda sesión en la que sólo accederán los miembros del tribunal. El tribunal firmará un acta que debe reflejar los acuerdos adoptados con respecto a la calificación final de cada estudiante (Anexos IX y X) y se remitirá a la dirección maria.j.martinez@uv.es con copia al departamento correspondiente (dep.quimica.xxxx@uv.es) y al presidente de la comisión de TFG (sergio.armenta@uv.es).