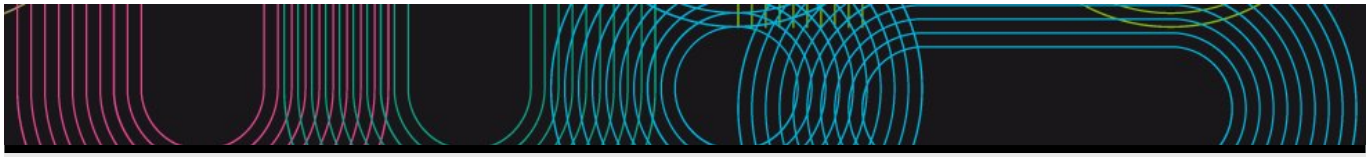

IDENTIFYING DATA				
Pharmaceutical chemistry				
Subject	Pharmaceutical chemistry			
Code	V11G200V01903			
Study programme	(*)Grao en Química			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	2nd
Teaching language	Spanish			
Department				
Coordinator	Terán Moldes, María del Carmen			
Lecturers	Domínguez Fernández, Irene Rincón Fontán, Mirian Terán Moldes, María del Carmen			
E-mail	mcteran@uvigo.es			
Web				
General description	The matter is allocated to contribute to the students basic knowledges on Pharmaceutical Chemistry, an interdisciplinar science that is among different disciplines of chemical and biological content, whose aim is the study of the bioactive compounds and in particular its discovery, development, identification and mechanism of action at molecular level.			

Competencies	
Code	
A1	Students have demonstrated knowledge and understanding in a field of study that builds upon their general secondary education, and is typically at a level that, whilst supported by advanced textbooks, includes some aspects that will be informed by knowledge of the forefront of their field of study
A3	Students have the ability to gather and interpret relevant data (usually within their field of study) to inform judgments that include reflection on relevant social, scientific or ethical issues
A4	Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences
A5	Students have developed those learning skills that are necessary for them to continue to undertake further study with a high degree of autonomy
C19	Apply knowledge and understanding to solve basic problems of quantitative and qualitative nature
C20	Evaluate, interpret and synthesize data and chemical information
C22	Process and perform computational calculations with chemical information and chemical data
C23	Present oral and written scientific material and scientific arguments to a specialized audience
D1	Communicate orally and in writing in at least one of the official languages of the University
D3	Learn independently
D4	Search and manage information from different sources
D5	Use information and communication technologies and manage basic computer tools
D7	Apply theoretical knowledge in practice
D8	Teamwork
D9	Work independently
D10	Work at a national and international context
D12	Plan and manage time properly
D13	Make decisions
D14	Analyze and synthesize information and draw conclusions
D15	Evaluate critically and constructively the environment and oneself
D16	Develop an ethical commitment
D17	Develop concern for environmental aspects and quality management

Learning outcomes	
Expected results from this subject	Training and Learning Results

Diferenciate and understand the concepts: drug, active principle, medicine and pharmacological target	A4	C20 C23	D1 D4 D5 D14
Differentiate the types of receptors, as well as an agonist drug from an antagonist.	A4 A5	C20 C23	D1 D3 D4 D5 D7 D9 D13 D14
Relate the physical chemical properties of drugs with their pharmacokinetics.	A1 A3 A5	C19 C20 C22 C23	D1 D3 D5 D7 D8 D14
Differentiate the pharmacomodulation techniques.	A3 A5	C19 C20 C23	D1 D4 D5 D7 D8
Differentiate a chemoterapeutic from a pharmacodynamic agent	A3 A4 A5	C19 C20 C23	D1 D3 D4 D7 D9
Familiarise with the most recent tools in drug design: combinatorial chemistry and computer-aided drug design (QSAR and docking methods)	A3 A5	C19 C20 C22 C23	D1 D3 D4 D5 D8 D12 D13 D15 D16
Describe the methods of structural analysis involved in drug design and differentiate the type of information that they provide	A3 A5	C19 C20 C22 C23	D1 D3 D5 D7 D9 D14 D15
Identify the different forms of drug administration and their fundamentals.	A1 A3 A4 A5	C19 C20 C23	D1 D3 D4 D9 D14
Identify the formulation and composition variables in the preparation of suspensions and emulsions, and describe their characteristic properties, as well as and the instability phenomena	A3 A5	C19 C20 C23	D1 D3 D9 D13 D14
Recognise the main stages of fermentative and enzymatic processes applied to the drug production, including production and purification steps	A3 A5	C19 C20 C22 C23	D1 D3 D4 D7 D8 D12 D14 D15

Apply the basic principles of safety and pollution control in operations and processes oriented to drug production	A3 A5	C19 C20 C23	D1 D3 D5 D8 D10 D13 D16 D17
Explain the sampling, pretreatment and sample preparation, as well as the appropriate instrumental techniques for the analysis of prime matters, bioactive compounds and pharmaceutical formulations in the biological media	A3 A5	C19 C20 C22 C23	D1 D3 D8 D13 D14

Contents

Topic	
Subject 1. Introduction: general aspects of Pharmaceutical Chemistry	Definitions, aims and scope of the Pharmaceutical Chemistry. Nomeclature of drugs and classification systems. Chemotherapeutic and pharmacodynamic agents
Subject 2. Drug targets	Types of drug targets. Drug-target interactions. Nucleic Acids, enzymes and proteins as drug targets.
Subject 3. Receptors as drug targets	Types of receptors. Agonist, antagonist and inverse agonist drugs. Measure and expression of pharrmacological effect. Drug tolerance and tachyphylaxis
Subject 4. Pharmacokinetic and related aspects	Absorption and transport through biological membranes, the Lipinski rules, bioavailabilty. Metabolism, prodrugs. Excretion. ways of drug administration and pharmaceutical forms.
Subject 5. Discovery, design and development of drugs	Strategies for lead discovery, serendipity, systematic screening, rational design. Pharmacomodulation. Patents. preclinical and clinical trials. Chemical development.
Subject 6. Strategies for drug design	Molecular modeling, indirect methods (QSAR, pharmacophore design), direct methods (docking).
Subject 7. Preparation, analysis and purification of drugs	Production in the pharmaceutical industry. fermentative processes. Drug processing.

Planning

	Class hours	Hours outside the classroom	Total hours
Master Session	26	52	78
Seminars	13	39	52
Outdoor study / field practices	3	3	6
Short answer tests	1	3	4
Long answer tests and development	2	8	10

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Master Session	In these sessions the professor will present in a structured form the general contents of the program, doing emphasis in important or difficult aspects of the subject. In addition, the professor, in advance and through the Tem@ platform, will make available to the student the material that will be used in these sessions. Students should previously check and complete this material by using the recommended literature. In addition, periodic controls will be carried out to follow the study and understanding of the subject. These tests will be performed during some master sessions which will be determined in advance
Seminars	They will devote time to discuss the most complicated aspects of the treated subjects, to use programs of molecular modeling which will allow to work with several biomolecules cocrystallized with different ligands, as well as to present works, researchs or summaries carried out by the students and related with the content of the subject.
Outdoor study / field practices	The students will visit a company of the pharmaceutical sector, in which it will be able to appreciate the process of production in all its phases. After the visit the students will have to answer, in schedule of class, to a test related with this visit.

Personalized attention

Methodologies	Description

Seminars	Time devoted by the teachers to attend the needs and queries of the students related with the study of the subject and developed activities. The teachers will inform in the presentation of the subject about the available schedule.

Assessment

	Description	Qualification	Training and Learning Results		
Master Session	Contents developed in the program study (subjects 1-6) will be evaluated by means of verbal or written questions formulated in the theoretical sessions. The written questions will be referents to the content treated in the previous two or three weeks.	7	A1 A3	C19 C23	D14 D15 D16
Seminars	Attendance and participation in the sessions, exercices and questions resolution, as well as the presentation of reports, summaries and works, will be qualified	23	A1 A3 A4 A5	C19 C20 C22 C23	D1 D3 D4 D5 D7 D8 D9 D10 D12 D13 D14 D16
Outdoor study / field practices	Attendance and active participation in the visit, as well as the results of the test will be qualified.	10	A3	C20	D14 D15 D17
Short answer tests	A short exam (one hour long) will be carried out at week nine. In this exam will enter the subject explained until that moment.	15	A1 A3 A5	C19 C20	D7 D12 D13 D14
Long answer tests and development	A global exam will be carried on closing date of evaluation in order to analyze the adquired competencies	45	A1 A3 A5	C19 C20	D7 D12 D13 D14

Other comments on the Evaluation

Participation of students in any of the evaluation parts, such as attendance to seminars (four or more) or the performace of written exams, will involve the condition of presented and therefore the obtaining of a qualification. Students should have a minimum mark in some of the evaluation parts in order to pass the subject. This minimum mark should be of 3.5 in the short test, and 4 in the global exam, as well as in seminars and study visit.

Evaluation in the July Call

1. Mark obtained by the students during the academic course: maximum 4 points

Marks obtained from verbal or written questions formulated in the theoretical sessions (maximun 0.7 point), visit test (maximun 1 point) and seminars (maximum 2.3 points) will be preserved.

2. Work carried out by the students: maximum 2 points

Finished the evaluation process of June, teachers will propose to the students who have not pass the subject to perform an individual work in order to adquire the competencies of which they will be evaluated in July. This work should be presented and defended before the exam.

The students will perform a written exam similar to June in which they will obtain a maximum of 4 points

Sources of information

Basic Bibliography

Complementary Bibliography

A. Delgado C. Minguillón y J. Juglar, **Introducción a la Química Terapéutica**, 2ª Edición 2003,

G. L. Patrick, **An introduction to Medicinal Chemistry**, 5th Edition 2013,

C. G. Wermuth, **4. The Practice of Medicinal Chemistry**, 3rd Edition 2008,

R. Renneberg, **Biotecnología para principiantes**, 2004,

Recommendations

Subjects that it is recommended to have taken before

Biology: Biology/V11G200V01101
IT tools and communication in chemistry/V11G200V01401
Physical chemistry I/V11G200V01303
Physical chemistry II/V11G200V01403
Organic chemistry I/V11G200V01304
Structural Determination/V11G200V01501
Chemical engineering/V11G200V01502
Analytical chemistry II/V11G200V01503
Biological chemistry/V11G200V01602
Organic chemistry II/V11G200V01504
Organic chemistry III/V11G200V01704