



1. General information

Course: TOXICOLOGY

Type: CORE COURSE

Degree: 376 - UNDERGRADUATE DEGREE PROGRAMME IN PHARMACY

Center: 14 - FACULTY OF PHARMACY

Year: 4

Main language: Spanish

Use of additional
languages:

Web site:

Code: 14335

ECTS credits: 6

Academic year: 2023-24

Group(s): 10

Duration: C2

Second language: English

English Friendly: Y

Bilingual: N

Lecturer: CARLOS ALONSO MORENO - Group(s): 10				
Building/Office	Department	Phone number	Email	Office hours
FACULTAD DE FARMACIA	QUÍMICA INORG., ORG., Y BIOQ.	8237	carlos.amoreno@uclm.es	Mondays and Wednesdays from 16-19h. Must be requested in advance by e-mail.
Lecturer: M^a DEL MAR ARROYO JIMENEZ - Group(s): 10				
Building/Office	Department	Phone number	Email	Office hours
Facultad de Farmacia. Área de Anatomía.	CIENCIAS MÉDICAS	8249	mariaamar.arroyo@uclm.es	Tuesdays and Thursday from 16-19h. Must be requested in advance by e-mail.
Lecturer: ELENA CALVO LEJARRAGA - Group(s): 10				
Building/Office	Department	Phone number	Email	Office hours
	CIENCIAS MÉDICAS		Elena.Calvo@uclm.es	
Lecturer: FELIPE DE LA CRUZ MARTÍNEZ - Group(s): 10				
Building/Office	Department	Phone number	Email	Office hours
FACULTAD DE FARMACIA	QUÍMICA INORG., ORG., Y BIOQ.		Felipe.Cruz@uclm.es	Tuesdays and Thursday from 16-19h. Must be requested in advance by e-mail.
Lecturer: NOEMÍ VILLASECA GONZÁLEZ - Group(s): 10				
Building/Office	Department	Phone number	Email	Office hours
Facultad de Farmacia	CIENCIAS MÉDICAS		Noemi.VGonzalez@uclm.es	Mondays and Wednesdays from 16-19h. Must be requested in advance by e-mail.

2. Pre-Requisites

There are no prerequisites to take this course, although it is recommended that the student has passed the courses of Chemistry, Anatomy, Biochemistry, Physiology, Physiopathology, General Pharmacology, Biopharmacology and Pharmacokinetics.

3. Justification in the curriculum, relation to other subjects and to the profession

Toxicology is a subject of the fourth year of the Degree of Pharmacy at the University of Castilla-La Mancha. This subject has a total of 6 ECTS credits and is taught every semester. The main objective is the toxicological training that allows the interpretation of scientific data related to xenobiotics. To this end, students will be provided with the necessary knowledge on basic toxicology, classification of toxic substances, mechanisms of toxicity, evaluation of toxicity, pathologies generated, and therapy. Likewise, the student will acquire knowledge about the methodologies that allow deduction of toxic concentrations in biological samples. ed

4. Degree competences achieved in this course

Course competences

Code	Description
B01	Proficiency in a second foreign language at level B1 of the Common European Framework of Reference for Languages.
B02	Knowledge of Information and Communication Technologies (ICT).
B03	A correct oral and written communication
B04	Ethical commitment and professional deontology.
B05	Ability to develop those learning skills necessary to undertake further studies.
EM02	Know and fully understand the basic fundamentals of clinical analysis, as well as the characteristics and contents of the laboratory diagnosis specifications
EM05	Know and understand the techniques used in the design and evaluation of pre-clinical and clinical trials.
EM07	Promote the rational use of medicines and health products.
EM11	Assess the toxicological effects of substances. Design and apply the corresponding tests and analysis.
EM13	Know and understand the structure and function of the human body, as well as the general mechanisms of disease, molecular, structural and functional alterations, syndromic expression and therapeutic tools to restore health.
EM14	Know the nature, mechanism of action and effect of the xenobiotics, as well as the protocols of action in case of poisoning

EM15	Know the analytical techniques related to laboratory diagnosis, toxic, food and environment determinations.
EM16	Know and fully understand the managements and characteristics of pharmaceutical assistance in the field of office and the pharmaceutical industry
G01	Identify, design, obtain, analyze, control and produce drugs and medicines, as well as other products and raw materials of sanitary interest for human or veterinary use.
G02	Evaluate the therapeutic and toxic effects of substances with pharmacological activity.
G03	Know how to apply the scientific method and acquire skills in the handling of legislation, sources of information, bibliography, elaboration of protocols and other aspects considered necessary for the design and critical evaluation of preclinical and clinical trials.
G04	Design, prepare, supply and dispense medicines and other products of health interest.
G05	Provide therapeutic advice in pharmacotherapy and dietotherapy, as well as in the nutritional and food field in the establishments where they provide services.
G06	Promote the rational use of medicines and medical devices, as well as to acquire basic knowledge in clinical management, health economics and the efficient use of health resources.
G07	Identify, evaluate and assess problems related to drugs and medicines, as well as participate in pharmacovigilance activities.
G08	Conducting clinical and social pharmacy activities, following the pharmaceutical care cycle.
G09	Intervene in health promotion and disease prevention activities at the individual, family and community levels, with an integral and multi-professional vision of the health-disease process.
G10	Design, apply and evaluate clinical reagents, methods and analytical techniques, knowing the basic principles of clinical analysis and the characteristics and contents of laboratory diagnostic reports.
G11	Evaluate the toxicological effects of substances and design and apply appropriate tests and trials.
G12	Develop hygienic-sanitary analyses, especially those related to food and environment.
G13	Develop communication and information skills, both oral and written, to deal with patients and users of the centre where they carry out their professional activity. Promote the capacity to work and collaborate with multidisciplinary teams and those related to other health professionals.
G14	Know the ethical and deontological principles according to the legislative, regulatory and administrative provisions governing professional practice, understanding the ethical implications of health in a changing social context.
G15	Recognise own limitations and the need to maintain and update professional competence, with particular emphasis on self-learning of new knowledge based on scientific evidence.
T01	Critical thinking skills based on the application of the scientific method
T02	Ability to manage quality scientific information, bibliography, specialized databases and resources accessible through the Internet.
T03	Handling of basic and specific software for the treatment of information and experimental results.
T04	Motivation for quality, safety at work and awareness of environmental issues, with knowledge of the internationally recognised systems for the correct management of these aspects.
T05	Organizational, planning and implementation skills.
T06	Ability to address human resources decision-making and management.
T07	Ability to work as a team and, where appropriate, exercise leadership functions, encouraging entrepreneurship.
T08	Develop interpersonal skills and the ability to function in an international and multicultural context.

5. Objectives or Learning Outcomes

Course learning outcomes

Description

To know the basic biomarkers of toxicity.

Understand the important current challenges of toxicology in the evaluation of the safety of medicines, household products and the effects of accidental and occupational exposure to natural and synthetic substances.

To know the bases of the general etiology of the most common poisonings and the treatment.

Know and understand the fundamentals of Toxicology.

Identify the toxic effects of exposure to different toxic substances.

Identify the toxic effects derived from the consumption of drugs and drugs of abuse.

Know how to make an expert report on the safety of a medicinal product.

Know how to use the fundamental techniques and methods for toxicological research (sampling, laboratory diagnosis, toxics, food and environment).

Develop risk assessment to prevent and treat poisonings.

Develop the best treatments in the event of poisoning from an overdose or prolonged use of a drug or non-therapeutic agent.

Know how to communicate results and conclusions.

Know how to determine the range of exposure that is safe and the level of exposure that can be hazardous to human health and the environment of a medicinal product or non-therapeutic chemical agent.

Know how to design protocols for toxicity testing in experimental animals to ensure the short- and long-term safety of drugs or other products before they are placed on the market.

Know how to interpret the results of in vivo and in vitro toxicity tests in the evaluation of a new medicinal product.

6. Units / Contents

Unit 1: Introduction to toxicology. Historical evolution

Unit 2: Introduction to toxicology. Systemic toxicology

Unit 3: Toxic substances. Metals.

Unit 4: Toxic substances. Radioactive wastes and atmospheric pollutants.

Unit 5: Toxic substances. Agrochemicals

Unit 6: Toxic substances. Solvents and vapors

Unit 7: Toxic substances. Chemical-toxicological analysis

Unit 8: Systemic toxicology. Neurotoxicity

Unit 9: Systemic toxicology. Hepatotoxicity

Unit 10: Systemic toxicology. Nephrotoxicity

Unit 11: Systemic toxicology. Other types of toxicity

Unit 12: Applied toxicology. Food, regulatory, forensic and clinical toxicology. Internships

ADDITIONAL COMMENTS, REMARKS

1. Buscatox
2. Determination of benzodiazepines by liquid chromatography in biological samples.
3. Determination of alcohol by gas chromatography in biological samples.
4. Determination of acetylcholinesterase.
5. Preparation of the toxicological report.

7. Activities, Units/Modules and Methodology							
Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	B01 B02 B03 B04 B05 EM02 EM05 EM07 EM11 EM13 EM14 EM15 EM16 G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 T01 T02 T03 T04 T05 T06 T07 T08	1.14	28.5	Y	N	Teaching resources will be available on the Moodle platform before the beginning of the activities. In addition, students will have access to complementary bibliographic and audiovisual material (books, review articles, videos) in the university library of the Albacete campus.
Class Attendance (practical) [ON-SITE]	Practical or hands-on activities	B01 B02 B03 B04 B05 EM02 EM05 EM07 EM11 EM13 EM14 EM15 EM16 G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 T01 T02 T03 T04 T05 T06 T07 T08	0.8	20	Y	Y	Practical teaching will be given in small groups within periods established in the academic calendar that do not coincide with other teaching activities of the course. They will be carried out in classrooms and/or laboratories. These activities are MANDATORY, so that the student will not be able to pass the course if they are not carried out properly.
Formative Assessment [ON-SITE]	Assessment tests	B01 B02 B03 B04 B05 EM02 EM05 EM07 EM11 EM13 EM14 EM15 EM16 G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 T01 T02 T03 T04 T05 T06 T07 T08	0.16	4	Y	Y	The student may request personal tutoring on the contents of the course by previously arranging an interview with the corresponding professor.
Study and Exam Preparation [OFF-SITE]	Self-study	B01 B02 B03 B04 B05 EM02 EM05 EM07 EM11 EM13 EM14 EM15 EM16 G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 T01 T02 T03 T04 T05 T06 T07 T08	3.6	90	Y	N	The student may request tutorials by e-mail or in person.
Project or Topic Presentations [ON-SITE]	project-based learning	B01 B02 B03 B04 B05 EM02 EM05 EM07 EM11 EM13 EM14 EM15 EM16 G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 T01 T02 T03 T04 T05 T06 T07 T08	0.3	7.5	Y	N	The active participation of the student will be assessed through the defense of the work called: "Apadrina". In addition, the active participation of the student will be valued during the last 5 sessions destined for the oral presentation and that will be taken into account in the final evaluation.
Total:			6	150			
Total credits of in-class work: 2.4			Total class time hours: 60				
Total credits of out of class work: 3.6			Total hours of out of class work: 90				

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System			
Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Test	70.00%	70.00%	Theoretical knowledge is evaluated, as well as its application to the resolution of problems and practical cases.
			Attendance in the practical classes is mandatory. The practices are mandatory activities, so the existence of an absence without proper justification, will mean that the student CAN NOT pass the course in the ordinary call. The grade obtained will represent 10% of the final grade of the course. In case the student does not pass the practical block in the ordinary exam,

Laboratory sessions	10.00%	10.00%	he/she will have another opportunity in the final exam of the extraordinary exam to pass the subject. Once the practical block has been passed, the grade obtained will be retained for the following two academic years. Students who do not pass the practical block due to unjustified lack of attendance will be evaluated in the extraordinary exam by means of a specific test in which they must demonstrate that they have achieved the practical competencies.
Theoretical papers assessment	20.00%	20.00%	The professors advise the student to regularly attend classroom activities during the course. Attendance, presentation and public defence of the work "apadrina" will be valued at 20% of the final grade of the course, which will take place during the last 5 classroom sessions that are included in the academic calendar.
Total:	100.00%	100.00%	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

EVALUATION OF THE THEORETICAL PART

70% of the final grade. It will consist of 1 TEST in the middle of the semester and 1 FINAL TEST (35% of the final grade each).

The partial test will have a value of 35% of the final grade. The student must know that in order to put away the subject, the grade of each of the tests must be equal to or higher than 4.

PRACTICAL PART EVALUATION

10% of the final grade. Attendance in the practical module is MANDATORY. Once the practical module has been passed, the grade obtained during the internship will be kept for the following two academic years. To pass the practical part, the student must obtain AT LEAST 4 points. In order to keep the practical grade for the following academic year, it must be equal to or higher than 5.0.

EVALUATION OF ACTIVITIES MODULE:

20% of the final grade. Its evaluation will be in the classroom through the preparation of an original work called "apadrina" c, which will be defended in public on the dates that will be indicated in due course. The attendance and active participation of the student in the 5 sessions scheduled in the calendar for the presentation of this activity will be taken into account.

Students who cannot perform this activity in person for justified reasons may request the teacher to perform a non-face-to-face activity of which they will be evaluated.

In order to keep the grade of the activity module for the following course, it must be equal to or higher than 5.0.

The course will be passed when the student obtains AT LEAST 5 POINTS in the overall grade.

Non-continuous evaluation:

VALUATION THEORETICAL PART

70% of the final grade. It will consist of a FINAL TEST that may include theoretical concepts, practical cases, problems, etc. In order to pass the theoretical content part, the student must obtain AT LEAST 4 POINTS in this test.

EVALUATION OF THE PRACTICAL PART

10% of the final grade. For those students who have failed the practical part, they will be able to take an exam of practical knowledge in the EXTRAORDINARY CALL. A grade of AT LEAST 4 POINTS is required to pass the practical part.

The student will have to pass independently each of the two parts (theory and practice) to pass the course so that if he/she has passed any of the parts in the ordinary exam it is not necessary to take the extraordinary exam.

In the event that only the practical part is passed, the grade obtained in this part will be retained for the following two academic years. However, if the part that is passed is the theoretical one and not the practical one, the course will be considered failed for both parts (theoretical and practical). In order to keep the practical grade for the following academic year, it must be equal to or higher than 5.0.

EVALUATION OF THE ACTIVITIES PART

The remaining 20% of the grade corresponds to the participation activities proposed throughout the course. Students who cannot perform these activities in person for justified reasons may request the teacher to perform a non-face-to-face activity for which they will be evaluated. In order to keep the practical grade for the following course, it must be equal to or higher than 5.0. The course will be passed when the student obtains AT LEAST 5 POINTS in the overall grade.

Specifications for the resit/retake exam:

The course will be passed when the student obtains AT LEAST 5 POINTS in the overall grade and HAS PREVIOUSLY pass D THE THEORETICAL AND PRACTICAL PART.

EVALUATION OF THE THEORETICAL PART

70% of the final grade. It will consist of a FINAL TEST that may include theoretical concepts, practical cases, problems, etc. In order to pass the theoretical content part, the student must obtain AT LEAST 4 POINTS in this test.

EVALUATION OF THE PRACTICAL MODULE

10% of the final grade. For those students who have failed the practical module, they will be able to take an exam of practical knowledge in the EXTRAORDINARY CALL. A grade of AT LEAST 4 POINTS is required to pass the practical module. In order to keep the practical grade for the following course, it must be equal or higher than 5.0.

EVALUATION OF ACTIVITIES MODULE

20% of the final grade. The possibility of recovering the activities part is not taken into consideration, so the grade obtained during the regular exam will be maintained.

The grade may be kept during the following two academic years, if the student so declares, as long as it is equal to or higher than 5.0.

Specifications for the second resit / retake exam:

Only students who meet the requirements set forth in the Student Evaluation Regulations of the University of Castilla-La Mancha will be eligible for this call and will be evaluated according to the criteria applied in the extraordinary call.

9. Assignments, course calendar and important dates

Not related to the syllabus/contents	
Hours	hours
Class Attendance (theory) [PRESENCIAL][Lectures]	36
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	20
Formative Assessment [PRESENCIAL][Assessment tests]	90
Study and Exam Preparation [AUTÓNOMA][Self-study]	4
Global activity	
Activities	hours
Class Attendance (theory) [PRESENCIAL][Lectures]	36
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	20
Formative Assessment [PRESENCIAL][Assessment tests]	90
Study and Exam Preparation [AUTÓNOMA][Self-study]	4
Total horas: 150	

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Manuel Repetto Jiménez, Guillermo Repetto Khun	Toxicología fundamental	Ediciones Díaz de Santos, S.A			2009	
Klaassen	Fundamentos de Toxicología	McGraw-Hill Interamericana de España S.L			2005	
Alumnos de Farmacia	Toxicoenciclopedia					
E. Mencías Rodríguez, L. M. Mayero Franco	Manual de Toxicología Básica	Ediciones Díaz de Santos		8479781369	2000	
Jose Bello Gutierrez, Adela López de Cerian Salsamendi	Fundamenttos de ciencia toxicológica	Ediciones Díaz de Santos, S.A			2001	