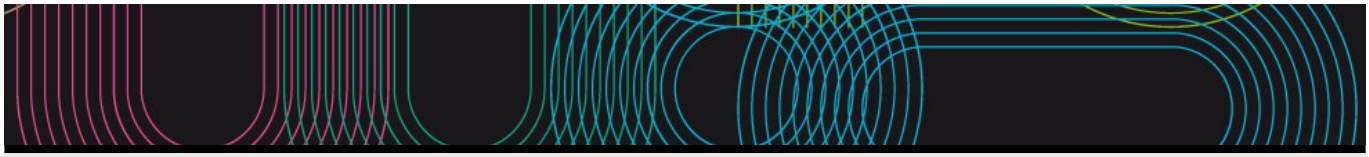

IDENTIFYING DATA				
Toxicity and Detoxification Mechanisms of Xenobiotic Compounds				
Subject	Toxicity and Detoxification Mechanisms of Xenobiotic Compounds			
Code	V02M098V01213			
Study programme	(*)Máster Universitario en Bioloxía Mariña			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	3	Optional	1st	2nd
Teaching language	Spanish			
Department				
Coordinator	San Juan Serrano, María Fuencisla			
Lecturers	García Martínez, Paz San Juan Serrano, María Fuencisla			
E-mail	fsanjuan@uvigo.es			
Web				
General description	Absorption, distribution, metabolism, toxic effects and excretion of pollutants compounds in marine organisms.			

Competencies	
Code	
A1	(*)Posuír e comprender coñecementos que acheguen unha base ou oportunidade de ser orixinais no desenvolvemento e/ou aplicación de ideas, adoito nun contexto de investigación.
A2	(*)Que os estudantes saiban aplicar os coñecementos adquiridos e a súa capacidade de resolución de problemas en contornos novos ou pouco coñecidos dentro de contextos máis amplos (ou multidisciplinares) relacionados coa súa área de estudo.
A3	(*)Que os estudantes sexan capaces de integrar coñecementos e se enfrontar á complexidade de formular xuízos a partir dunha información que, sendo incompleta ou limitada, inclúa reflexións sobre as responsabilidades sociais e éticas vinculadas á aplicación dos seus coñecementos e xuízos.
A4	(*)Que os estudantes saiban comunicar as súas conclusións, e os coñecementos e razóns últimas que as sustentan, a públicos especializados e non especializados dun xeito claro e sen ambigüidades.
A5	(*)Que os estudantes posúan as habilidades de aprendizaxe que lles permitan continuar estudando dun xeito que terá que ser, en grande medida, autodirixido e autónomo.
B2	Búsqueda, análisis e integración de información a partir de diferentes fuentes y capacidad para su interpretación y evaluación
B5	Desarrollo de la habilidad de elaboración, presentación y defensa de trabajos e informes técnicos
B6	Desarrollo de la curiosidad científica, de la iniciativa y la creatividad
B7	Entendimiento de la proyección social de la ciencia
C5	Conocimiento de los principios de explotación y sostenibilidad del medio marino y planificación y supervisión de su gestión
C6	Conocimiento, identificación y evaluación de la calidad ambiental del medio marino y de la legislación vigente. Dirección de consultorías ambientales
C7	Catalogación, evaluación, conservación, restauración y gestión de áreas marinas y litorales protegidos. Elaboración, asesoramiento legal y ejecución de planes de ordenación del litoral
C12	Control de calidad y seguridad de alimentos y de productos de transformación y biotecnológicos de origen marino
C13	Divulgación de conocimientos de la biología y el medio marinos: programas de formación y docencia; planificación y dirección de acuarios, museos, centros de interpretación ambiental, parques naturales y espacios naturales protegidos
C14	Elaboración, discusión, interpretación, asesoramiento y peritaje de informes científico-técnicos, éticos, legales y socioeconómicos relacionados con el ámbito marino y pesquero
D1	Desarrollo de las capacidades comprensivas, de análisis y síntesis
D2	Desarrollo de la capacidad de razonamiento crítico y autocrítico

D3	Desarrollo de las capacidades de trabajo en equipo, enriquecidas por la pluridisciplinariedad
D4	Desarrollo de la capacidad para actualizar el conocimiento de forma autónoma
D6	Desarrollo de las capacidades de reflexión sobre responsabilidades sociales y éticas
D7	Desarrollo de habilidades para la divulgación de ideas en contextos tanto académicos como no especializados

Learning outcomes

Expected results from this subject	Training and Learning Results
Knowledge and understanding of the cellular and molecular mechanisms of toxicity and response of organisms to environmental pollution.	A1 A2 A3 B2 B6 C5 C6 C13 D1 D2 D4
Ability to integrate knowledge from different disciplines to understand and explain phenomena of environmental toxicology.	A2 A3 B7 C5 C6 D1 D2 D6
Ability to evaluate and interpret data about environmental pollution from a toxicological perspective	A2 A3 B2 C6 C7 C12 C14 D1 D2 D6
Ability to obtain information, analyze it critically and apply it to assess of quality, exploitation and sustainability of marine environment.	A2 A3 A5 B2 B6 B7 C6 C7 C12 C14 D1 D2 D4 D6
Ability to develop individual and / or team works, and to expose them and discuss them in public.	A3 A4 A5 B2 B5 B6 C13 D1 D2 D3 D4 D6 D7

Contents

Topic

Xenobiotics and Toxicity	Definition of xenobiotic. Factors Affecting Toxicity. Phases of toxic action.
Exposure, Absorption and Distribution of Xenobiotics	Factors affecting the absorption and distribution of xenobiotics in the body. Elimination / Excretion.
Mechanisms of toxicity	Genotoxicity. Neurotoxicity. Hormonal disruptors. Metabolic disorders. Destabilization of cell membranes.
Metabolism of xenobiotics	Oxidation reactions: dependent and independent cytochrome P450 monooxygenases. Reactions of reduction and hydrolysis. Conjugation Reactions.
Sequestration processes	Non-metabolizable xenobiotics. Mechanisms of sequestration. Immobilization and transport of metals in cells: metallothioneins. Toxic metal elimination.
Oxidative stress and antioxidant defense	Production of oxy-radicals and oxidative stress. Biological effects of reactive oxygen species. Antioxidant Cellular Defenses.
Biomonitoring and biomarkers	Specificity of biomarkers. Relationship between biomarkers and adverse effects of pollution. Global and specific biomarkers. Role of biomarkers in environmental assessment

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	18	34	52
Presentation	2	20	22
Objective questions exam	1	0	1

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

Methodologies

	Description
Lecturing	In master sessions the teacher will give the fundamental concepts so that the student understands and can prepare the subject contents.
Presentation	Personal or team work and oral and/or written exhibition of a bibliographic work on some specific topic related with the subject.

Personalized assistance

Methodologies	Description
Lecturing	Resolution of doubts during the subject study and the bibliographic work elaboration, individually and / or in group.
Presentation	Resolution of doubts during the subject study and the bibliographic work elaboration, individually and / or in group.

Assessment

	Description	Qualification	Training and Learning Results			
Lecturing	The acquired theoretical knowledge will be assessed through a final test exam.	40	A1 A2 A3 A5	B2	C6 C7 C12	D1 D2 D6
Presentation	In the presentation and exhibition of bibliographic work will be assessed the ability to search information in databases, to handle scientific literature, to identify and synthesize the fundamental ideas, to relate and apply the concepts acquired, to use the appropriate terminology in toxicology, and to transmit information. As transversal skills, the initiative, capacity for autonomous learning, teamwork, organizational ability, critical capacity and handling of informatic tools, will be assessed.	60	A1 A2 A3 A4 A5	B2 B5 B6 B7	C5 C6 C7 C13 C14	D1 D2 D3 D4 D6 D7

Other comments on the Evaluation

The realization of the bibliographic work is compulsory for passing the subject.
The final test exam is compulsory for passing the subject and should be 5 (over 10) in order to take into account the bibliographic work score.

Sources of information

Basic Bibliography

Complementary Bibliography

Boelsterli U.A., **Mechanistic toxicology. The molecular basis of how chemicals disrupt biological targets**, 2007

Gibson G.G. and Skett P., **Introduction to drug metabolism**, 2001

Lewis D.F.V., **Guide to Cytochromes P450. Structure and function**, 2001

Malins D.C., Ostrander G., **Aquatic Toxicology: Molecular, Biochemical and Cellular Perspectives**, 1994

Taylor E.W., **Toxicology of Aquatic Pollution. Physiological, Molecular and Cellular Approaches**, 2009

Timbrell J., **Principles of Biochemical Toxicology**, 2008

Walker C.H., Hopkin S.P., Sibly R.M., Peakall D.B., **Principles of Ecotoxicology**, 2012

Frank C. Lu and Sam Kacew, **Lu's Basic Toxicology: Fundamentals, Targed Organs, and Risk Assessment**, 6ª Ed., 2013

Grune T., **Oxidants and Antioxidants Defense Systems**, 2005

Farooqui T., Farooqui A.A., **Oxidative Stress in Vertebrates and Invertebrates. Molecular aspects of cell signaling**, 2012

Recommendations

Subjects that it is recommended to have taken before

Marine Pollution and Ecotoxicology/V02M098V01206
Physiology of Marine Organisms/V02M098V01106

Contingency plan

Description

=== EXCEPTIONAL PLANNING ===
Given the uncertain and unpredictable evolution of the health alert caused by COVID-19, the University of Vigo establishes an extraordinary planning that will be activated when the administrations and the institution itself determine it, considering safety, health and responsibility criteria both in distance and blended learning. These already planned measures guarantee, at the required time, the development of teaching in a more agile and effective way, as it is known in advance (or well in advance) by the students and teachers through the standardized tool.

=== ADAPTATION OF THE METHODOLOGIES ===
* Teaching methodologies maintained: ALL

* Teaching methodologies modified: ANY

* Non-attendance mechanisms for student attention (tutoring): THE PERSONALISED ASSISTANCE WILL TAKE PLACE IN THE VIRTUAL CLASSROOMS THAT THE PROFESSORS HAVE ENABLED IN HIS RESPECTIVE UNIVERSITIES.

* Modifications (if applicable) of the contents: NOT PROCEED

* Additional bibliography to facilitate self-learning

* Other modifications

=== ADAPTATION OF THE TESTS ===
* Tests already carried out
Test XX: [Previous Weight 00%] [Proposed Weight 00%]
...

* Pending tests that are maintained
Test XX: [Previous Weight 00%] [Proposed Weight 00%]
...

* Tests that are modified
[Previous test] => [New test]

* New tests

* Additional Information

- THE CONTENT AND PRESENCIALIDAD OF LECTURING AND SEMINARS WILL BE MAINTAINED THE SAME THAT IN NORMAL CIRCUMSTANCES.

- THE EVALUATION TESTS AND THE WEIGHT OF EACH ONE IN THE NOTE OF THE SUBJECT WILL BE THE SAME THAT IN NORMAL CIRCUMSTANCES.

- IN CASE OF MIXED OR VIRTUAL TEACHING, IT WILL BE IN THE VIRTUAL CLASSROOM THAT THE PROFESSORS HAVE ENABLED IN HIS RESPECTIVE UNIVERSITIES.