



INTERNATIONAL
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PR/CL/001



E.T.S. de Ingenieros de Minas y
Energía

ANX-PR/CL/001-01

LEARNING GUIDE

SUBJECT

63000257 - Human Health Risk Assessment

DEGREE PROGRAMME

06CA - Master Universitario En Contaminación De Suelos Y Aguas Subterráneas

ACADEMIC YEAR & SEMESTER

2024/25 - Semester 1

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1. Description

1.1. Subject details

Name of the subject	63000257 - Human Health Risk Assessment
No of credits	4 ECTS
Type	Compulsory
Academic year of the programme	First year
Semester of tuition	Semester 1
Tuition period	September-January
Tuition languages	English
Degree programme	06CA - Master Universitario en Contaminación de Suelos y Aguas Subterráneas
Centre	06 - Escuela Técnica Superior De Ingenieros De Minas Y Energía
Academic year	2024-25

2. Faculty

2.1. Faculty members with subject teaching role

Name and surname	Office/Room	Email	Tutoring hours *
Miguel Izquierdo Diaz	423	miguel.izquierdo@upm.es	M - 15:00 - 18:00 W - 15:00 - 18:00 Solicitar tutoría de forma previa mediante correo electrónico / Please request your tutoring hours by email

Antonio Leoncio Callaba De Roa	415	antonio.callaba@upm.es	F - 16:00 - 20:00 Solicitar tutoría de forma previa mediante correo electrónico / Please request your tutoring hours by email
Eduardo De Miguel Garcia	415	eduardo.demiguel@upm.es	Tu - 11:30 - 13:30 Tu - 14:30 - 15:30 W - 11:30 - 13:30 W - 14:30 - 15:30 Solicitar tutoría de forma previa mediante correo electrónico / Please request your tutoring hours by email
Fernando Barrio Parra (Subject coordinator)	432	fernando.barrio@upm.es	M - 10:00 - 13:00 Tu - 10:00 - 13:00 Solicitar tutoría de forma previa mediante correo electrónico / Please request your tutoring hours by email

* The tutoring schedule is indicative and subject to possible changes. Please check tutoring times with the faculty member in charge.

2.2. Research assistants

Name and surname	Email	Faculty member in charge
Serrano Garcia, Humberto	humberto.serrano@upm.es	Barrio Parra, Fernando

3. Prior knowledge recommended to take the subject

3.1. Recommended (passed) subjects

- Geoquímica Del Subsuelo

3.2. Other recommended learning outcomes

- Inorganic Chemistry

- Organic Chemistry

- Geology

4. Skills and learning outcomes *

4.1. Skills to be learned

CB06 - Poseer y comprender conocimientos que aporten una base u oportunidad de ser originales en el desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación

CB08 - Que los estudiantes sean capaces de integrar conocimientos y enfrentarse a la complejidad de formular juicios a partir de una información que, siendo incompleta o limitada, incluya reflexiones sobre las responsabilidades sociales y éticas vinculadas a la aplicación de sus conocimientos y juicios

CB09 - Que los estudiantes sepan comunicar sus conclusiones y los conocimientos y razones últimas que las sustentan a públicos especializados y no especializados de un modo claro y sin ambigüedades

CB10 - Que los estudiantes posean las habilidades de aprendizaje que les permitan continuar estudiando de un modo que habrá de ser en gran medida autodirigido o autónomo.

CE10 - Manejar e interpretar conceptos de toxicología aplicados a la evaluación de riesgos para salud humana

CE11 - Manejar modelos de estimación de la exposición para el cálculo de niveles de riesgo para salud humana y de concentraciones objetivo

CT01 - Emitir juicios en función de criterios, de normas externas o de reflexiones personales

CT02 - Desarrollar habilidades para trabajar en contextos internacionales, respetando y considerando entornos socioculturales y científico-técnicos distintos, en los trabajos y proyectos realizados

CT04 - Gestionar la información procedente de diversas fuentes, valorando su relevancia, fiabilidad y pertinencia para un propósito determinado, analizándola y organizándola

CT05 - Proponer alternativas creativas y originales, valorando su viabilidad en la solución de problemas en el ámbito de la ingeniería

CT07 - Redactar memorias, informes y artículos científicos y técnicos

CT08 - Utilizar la lengua inglesa para la comunicación oral y escrita a nivel avanzado en entornos académicos y profesionales

4.2. Learning outcomes

RA18 - Apply the methodology of risk assessment to evaluate site-specific risk scenarios and to define regulatory guideline values

RA16 - Analyze and use toxicological information for human-health risk assessments

RA17 - Design exposure conceptual site models and assess exposure doses received through multiple exposure pathways

* The Learning Guides should reflect the Skills and Learning Outcomes in the same way as indicated in the Degree Verification Memory. For this reason, they have not been translated into English and appear in Spanish.

5. Brief description of the subject and syllabus

5.1. Brief description of the subject

This course explores the fundamentals of human health risk assessments and presents the modelling tools used for that purpose.

5.2. Syllabus

1. CHAPTER #1. Introduction: Concept of risk, risk paradigm and structure of an environmental risk assessment.
2. CHAPTER #2. Dose-Response Assessment: Qualitative and quantitative evaluation of toxicity.
3. CHAPTER #3. Exposure Assessment and Risk Characterization: Identification of exposure pathways, quantification of doses and numerical evaluation of risk.
 - 3.1. Ingestion & Bioaccessibility
 - 3.2. Inhalation & Vapor intrusion
4. CHAPTER #4. Probabilistic Risk Assessment
5. CHAPTER #5. Risk-based environmental legislation
6. CHAPTER #6. Commercial and free software for environmental risk assessment.

6. Schedule

6.1. Subject schedule*

Week	Type 1 activities	Type 2 activities	Distant / On-line	Assessment activities
1	Introduction Duration: 02:00 Lecture Fundamentals of Dose-Response Assessment (1/3) Duration: 02:00 Lecture			
2	Fundamentals of Dose-Response Assessment (2/3) Duration: 02:00 Lecture Fundamentals of Dose-Response Assessment (3/3) Duration: 01:00 Lecture	Toxicity Databases (1/2) Duration: 01:00 Laboratory assignments		Assignment #1 Individual work Progressive assessment Not Presential Duration: 01:00 Assignment #2 Individual work Progressive assessment Not Presential Duration: 01:00
3	Exposure Assessment Duration: 02:00 Lecture	Toxicity Databases (2/2) Duration: 02:00 Laboratory assignments		Assignment #3 Individual work Progressive assessment Not Presential Duration: 01:00 Assignment #4 Individual work Progressive assessment Not Presential Duration: 01:00
4	Exposure Assessment & Risk Characterization Duration: 02:00 Lecture Risk Characterization exercises Duration: 01:30 Problem-solving class Solved assignments #1 - #4 Duration: 00:30 Lecture			
	Seminar #1: Risk-based legislation: Guideline Values (Spanish NGRs) & Spanish RD 9/2005 Duration: 01:30 Lecture Case-study: Application to licensing a new commercial product (required)			Assignment #5 Individual work Progressive assessment Not Presential Duration: 03:30 Class test: Application to licensing a new commercial product

5	<p>previous reading) Duration: 00:30 Cooperative activities</p> <p>Probabilistic Risk Assessment Duration: 02:00 Lecture</p> <p>Class Test #1 Duration: 00:30 Additional activities</p>			<p>Written test Progressive assessment Not Presential Duration: 00:30</p>
6	<p>Seminar #2: Risk assessment and the work of Regulatory Agencies - Madrid Environmental Agency Duration: 02:00 Lecture</p> <p>Commercial Software (1/3) Duration: 02:00 Lecture</p>			<p>Assignment #6 Individual work Progressive assessment Not Presential Duration: 05:00</p> <p>Group Project #1 Group work Progressive assessment Not Presential Duration: 25:00</p>
7	<p>Class test: RD 9/2005 + Madrid Environmental Agency's Technical Guide for Risk Assessment Duration: 00:30 Cooperative activities</p> <p>Solved assignment #5 & #6 Duration: 00:30 Problem-solving class</p> <p>Class Test #2 Duration: 00:30 Additional activities</p>	<p>Commercial Software (2/3) Duration: 03:00 Laboratory assignments</p>		<p>Class Test: Regulatory Agencies and risk assessment Written test Progressive assessment Presential Duration: 00:30</p> <p>Assignment #7 Individual work Progressive assessment Not Presential Duration: 05:30</p> <p>Group Project #2 Group work Progressive assessment Not Presential Duration: 26:00</p>
8	<p>Solved assignment #7 Duration: 00:30 Problem-solving class</p>	<p>Commercial and free Software (3/3) Duration: 03:30 Laboratory assignments</p>		
9				<p>Final Test Written test Progressive assessment Presential Duration: 04:00</p> <p>Final Exam Written test Global examination Presential Duration: 04:00</p>
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Depending on the programme study plan, total values will be calculated according to the ECTS credit unit as 26/27 hours of student face-to-face contact and independent study time.

7. Activities and assessment criteria

7.1. Assessment activities

7.1.1. Assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
2	Assignment #1	Individual work	No Presential	01:00	3.1%	/ 10	CE10 CT04 CT08
2	Assignment #2	Individual work	No Presential	01:00	.8%	/ 10	CE10 CT04 CT08
3	Assignment #3	Individual work	No Presential	01:00	4.6%	/ 10	CE10 CT01 CT04 CT08
3	Assignment #4	Individual work	No Presential	01:00	2.3%	/ 10	CE10 CT04 CT08
5	Assignment #5	Individual work	No Presential	03:30	6.1%	/ 10	CE10 CE11 CT01 CT04 CB06 CT08
5	Class test: Application to licensing a new commercial product	Written test	No Presential	00:30	2.5%	/ 10	CE10 CE11 CT01 CT08
6	Assignment #6	Individual work	No Presential	05:00	7.7%	/ 10	CE10 CE11 CB10 CT01 CT04 CT05 CB08 CB06 CT08
6	Group Project #1	Group work	No Presential	25:00	15%	/ 10	CE10 CE11 CB09 CB10 CT01 CT04 CT05

							CT07 CB08 CB06 CT02 CT08
7	Class Test: Regulatory Agencies and risk assessment	Written test	Face-to-face	00:30	2.5%	/ 10	CE10 CE11 CT04
7	Assignment #7	Individual work	No Presential	05:30	5.4%	/ 10	CE10 CE11 CB10 CT04 CT05 CT08
7	Group Project #2	Group work	No Presential	26:00	15%	/ 10	CE10 CE11 CB09 CB10 CT01 CT04 CT05 CT07 CB08 CB06 CT02 CT08
9	Final Test	Written test	Face-to-face	04:00	35%	3 / 10	CE10 CE11 CT01 CT04 CT05 CB08 CB06 CT08

7.1.2. Global examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
9	Final Exam	Written test	Face-to-face	04:00	100%	5 / 10	CE10 CE11 CB09 CB10 CT01 CT04 CT05 CT07 CB08 CB06 CT02 CT08

7.1.3. Referred (re-sit) examination

Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
Final Exam	Written test	Face-to-face	04:00	100%	5 / 10	CE10 CE11 CB09 CB10 CT01 CT04 CT05 CT07 CB08 CB06 CT02 CT08

7.2. Assessment criteria

Evaluation will be carried out progressively, through the submission of assignments during the course. At the end of the course, there will be a global exam of the whole subject. The assessment methodology will be the same for all students. The learning outcomes assessed will be RA16, RA17 and RA18.

If students fail to pass the course during the ordinary exam, they will have to take a comprehensive exam of the whole subject during the extraordinary exam. The learning outcomes assessed will be RA16, RA17 and RA18.

8. Teaching resources

8.1. Teaching resources for the subject

Name	Type	Notes
Course presentations & Notes	Web resource	Course web page (moodle)
Technical guides & reports	Bibliography	Course web page (moodle)

9. Other information

9.1. Other information about the subject

Supplementary reference material:

- CONNELL, D.W. (1997): Basic Concepts of Environmental Chemistry. Lewis Publishers, Boca Raton, Fl. (U.S.A.)
- CROSBY, D.G. (1998): Environmental Toxicology and Chemistry. Oxford University Press, Nueva York.
- KLAASSEN, C.D. y WATKINS III, J.B. (eds.) (2003): Casarett & Doull's essentials of Toxicology. McGraw-Hill, Nueva York.
- MANAHAN, S.E. (1994): Environmental Chemistry, 6th Edition. CRC Press. Boca Raton, Fl. (U.S.A.)
- U.S. ENVIRONMENTAL PROTECTION AGENCY (1989): Risk Assessment Guidance for Superfund (RAGS) Part A. Chapter 6: Exposure Assessment.
<http://www.epa.gov/oswer/riskassessment/ragsa/pdf/ch6.pdf>
- U.S. ENVIRONMENTAL PROTECTION AGENCY (1989): Risk Assessment Guidance for Superfund (RAGS) Part A. Chapter 7: Toxicity Assessment.
<http://www.epa.gov/oswer/riskassessment/ragsa/pdf/ch7.pdf>
- U.S. ENVIRONMENTAL PROTECTION AGENCY (1989): Risk Assessment Guidance for Superfund (RAGS) Part A. Chapter 8: Risk Characterization.
<http://www.epa.gov/oswer/riskassessment/ragsa/pdf/ch8.pdf>

- U.S. ENVIRONMENTAL PROTECTION AGENCY (1986a): Carcinogen Risk Assessment. 51 Federal Register 33992.
- U.S. ENVIRONMENTAL PROTECTION AGENCY (1992): Guidelines for Exposure Assessment. EPA/600/Z-92/001

The subject is related with the following Sustainable Development Objectives: ODS3, ODS6 y ODS15