COORDINATION PROCESS OF
LEARNING ACTIVITIES
PR/CL/001

INTERNATIONAL
CAMPUS OF
EXCELLENCE

POLITÉCNICA

E.T.S. de Ingenieros
Informaticos

ANX-PR/CL/001-01

LEARNING GUIDE

SUBJECT

103000836 - Data Management And Knowledge In Health

DEGREE PROGRAMME

10AZ - Master Universitario En Innovación Digital

ACADEMIC YEAR & SEMESTER

2021/22 - Semester 1

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Learning guide

1. Description

1.1. Subject details

Name of the subject	103000836 - Data Management And Knowledge In Health
No of credits	4 ECTS
Type	Optional
Academic year ot the programme	Second year
Semester of tuition	Semester 3
Tuition period	September-January
Tuition languages	English
Degree programme	10AZ - Master Universitario en Innovación Digital
Centre	10 - Escuela Tecnica Superior De Ingenieros Informaticos
Academic year	2021-22

2. Faculty

2.1. Faculty members with subject teaching role

Name and surname	Office/Room	Email	Tutoring hours *
Jose Crespo Del Arco	2311	jose.crespo@upm.es	Th - 14:00 - 20:00
Miguel Garcia Remesal		miguel.garcia.remesal@upm.es	Sin horario.
Victor Manuel Maojo Garcia (Subject coordinator)	2102	victormanuel.maojo@upm.es	Tu - 11:00 - 14:00 W - 11:00 - 14:00
David Perez Del Rey	2104	david.perez.rey@upm.es	M - 11:00 - 14:00 Th - 13:00 - 14:00

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

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2.2. Research assistants

Name and surname	Email	Faculty member in charge
Paraiso Medina, Sergio	sergio.paraiso@upm.es	Maojo Garcia, Victor Manuel

2.3. External faculty

Name and surname	Email	Institution
Raul Alonso Calvo	ralonso@infomed.dia.fi.upm.es	ETSII
Sergio Paraiso	sergio.paraiso@upm.es	ETSIII

3. Skills and learning outcomes *

3.1. 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

CB07 - Que los estudiantes sepan aplicar los conocimientos adquiridos y su capacidad de resolución de problemas en entornos nuevos o poco conocidos dentro de contextos más amplios (o multidisciplinares) relacionados con su área de estudio

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

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.

CE-DIPO04 - Capacidad para analizar las necesidades de información que se plantean en un entorno y llevar a cabo en todas sus etapas el proceso de diseño centrado en el usuario

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CE-EIT03 - Capacidad para identificar el nivel de madurez de una tecnología y desarrollar e interpretar un roadmap tecnológico seleccionando la mejor manera de proteger esa tecnología dependiendo de su tipo, nivel de madurez y las restricciones geográficas, y entendiendo las consecuencias de acceder a ella y comercializarla.

CE-FT01 - Capacidad para seleccionar las soluciones de almacenamiento, manipulación, análisis y visualización para datos estructurados y no estructurados financieros de fuentes heterogéneas adecuadas en función del problema a resolver y realizar una correcta comunicación del análisis

CE-HMDA07 - Capacidad para diseñar y gestionar proyectos de salud y datos médicos

3.2. Learning outcomes

RA103 - Being able to understand the data science?s implications for management and decision making in a datarich environment.

RA68 - Identify areas of application where techniques of intelligent systems can be used

RA112 - Deal with unstructured health data

RA49 - apply IA techniques in real data scenarios

RA34 - Conocer cómo se aplican las técnicas de computación científica en algún campo específico de ciencia o ingeniería.

RA114 - Extract and manipulate data from public sources

RA14 - Apply the acquired knowledge in real contexts

* 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.

4. Brief description of the subject and syllabus

4.1. Brief description of the subject

Biomedical informatics is a scientific discipline created in the 60s with the intention of improving the management of data, information and knowledge in the biomedical area. Achievements include the creation of decision support systems, electronic medical records, omic projects, hospital information systems, terminologies and other projects of similar importance. The creation of the so-called digital medicine and precision medicine are the latest advances in this direction, seeking ubiquitous computing, with the goal of improving the health of the citizen. There will be a survey of bioinfomatics techniques, from a practical perspective.

The management of data and knowledge in health has its own characteristics. The design of the studies and the evaluation of the results, for example, are completely different from those that are necessary in other multiple areas.

4.2. Syllabus

1. Introduction to the course

2. Data,information and knowledge: concepts and foundations

3. Data integration: techniques and concepts

4. Electronic health records and departmental systems

5. Artificial Intelligence in Biomedicine

6. Data and text mining

7. Bioinformatics: basis concepts and techniques

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5. Schedule

5.1. Subject schedule*

Week	Face-to-face classroom activities	Face-to-face laboratory activities	Distant / On-line	Assessment activities
1	**Introduction** Duration: 02:00		**Use of distance learning may be necessary due to the pandemia. Instructions will be provided by the university** Duration: 00:00	
2	**Data, information and knowledge in biomedicine** Duration: 02:00		**Use of distance learning may be necessary due to the pandemia. Instructions will be provided by the university** Duration: 00:00	
3	**Research design for studies in biomedicine** Duration: 02:00		**Use of distance learning may be necessary due to the pandemia. Instructions will be provided by the university** Duration: 00:00	
4	**Artificial intelligence in biomedicine: medical reasoning and foundations** Duration: 02:00		**Use of distance learning may be necessary due to the pandemia. Instructions will be provided by the university** Duration: 00:00	
5	**Artificial intelligence in biomedicine: medical decision support** Duration: 02:00		**Use of distance learning may be necessary due to the pandemia. Instructions will be provided by the university** Duration: 00:00	
6	**Biomedical vocabularies and standards I** Duration: 02:00		**Use of distance learning may be necessary due to the pandemia. Instructions will be provided by the university** Duration: 00:00	
7	**Biomedical vocabularies and standards II** Duration: 02:00		**Use of distance learning may be necessary due to the pandemia. Instructions will be provided by the university** Duration: 00:00	

8	**Electronic Health Records and Hospital Information Systems I** Duration: 02:00		Use of distance learning may be necessary due to the pandemia. Instructions will be provided by the university Duration: 00:00	
9	**Presentation of assignments** Duration: 02:00		Use of distance learning may be necessary due to the pandemia. Instructions will be provided by the university Duration: 00:00	**Presentation of assignment** Continuous assessment Presential Duration: 00:00
10	**Electronic Health Records and Hospital Information Systems II** Duration: 02:00		Use of distance learning may be necessary due to the pandemia. Instructions will be provided by the university Duration: 00:00	
11	**Integration and interoperability for health data and knowledge sources I** Duration: 02:00		Use of distance learning may be necessary due to the pandemia. Instructions will be provided by the university Duration: 00:00	
12	**Integration and interoperability for health data and knowledge sources II** Duration: 02:00		Use of distance learning may be necessary due to the pandemia. Instructions will be provided by the university Duration: 00:00	
13	**Bioinformatics applications in biomedicine. Techniques and applications for data sequence processing and analysis. Sequence allignment. Clinical applications** Duration: 02:00		Use of distance learning may be necessary due to the pandemia. Instructions will be provided by the university Duration: 00:00	
14	**Presentation of assignments** Duration: 02:00		Use of distance learning may be necessary due to the pandemia. Instructions will be provided by the university Duration: 00:00	**Presentation of second assignment** Continuous assessment Presential Duration: 00:00
15				
16				**An assignment that will include topics from the two regular assignments** Final examination Not Presential Duration: 00:00
17				

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.

* The schedule is based on an a priori planning of the subject; it might be modified during the academic year, especially considering the COVID19 evolution.

6. Activities and assessment criteria

6.1. Assessment activities

6.1.1. Continuous assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
9	Presentation of assignment		Face-to-face	00:00	50%	3 / 10	CB07 CE-HMDA07 CB06 CB08 CE-DIPO04 CB10 CE-EIT03 CE-FT01
14	Presentation of second assignment		Face-to-face	00:00	50%	3 / 10	CB07 CE-HMDA07 CB06 CB08 CE-DIPO04 CB10 CE-EIT03 CE-FT01

6.1.2. Final examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
16	An assignment that will include topics from the two regular assignments		No Presential	00:00	100%	5 / 10	CB06 CB08 CE-DIPO04 CB10 CE-EIT03 CE-FT01 CB07 CE-HMDA07

6.1.3. Referred (re-sit) examination

No se ha definido la evaluación extraordinaria.

6.2. Assessment criteria

Presentations of assignment, online and (to be decided according to the pandemia context) in groups of 2-3 students

7. Teaching resources

7.1. Teaching resources for the subject

Name	Type	Notes
PUBmed and its resources (NCBI, for instance=I	Web resource	Different bibliographic and research databases
Biomedical Informatics books	Bibliography	Available at the website of the American Medical Informatics Association
Journals available within the UPM network	Bibliography	papers from the Journal of biomedical informatics, Journal of the American Medical Informatics Association, International Journal of Medical Informatics. All of them available over the Internet
Dispositivos para teleenseñanza (ordenador, tablet, móvil)	Equipment	For online lecturing and teaching

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8. Other information

8.1. Other information about the subject

We will emphasize from practical use of the tools and techniques explained in the course.