



POLITÉCNICA

INTERNATIONAL
CAMPUS OF
EXCELLENCE

COORDINATION PROCESS OF
LEARNING ACTIVITIES
PR/CL/001



E.T.S. de Ingenieros
Informáticos

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

2025/26 - Semester 1

Index

Learning guide

1. Description.....	1
2. Faculty.....	1
3. Skills and learning outcomes	2
4. Brief description of the subject and syllabus.....	3
5. Schedule.....	5
6. Activities and assessment criteria.....	7
7. Teaching resources.....	8
8. Other information.....	9

1. Description

1.1. Subject details

Name of the subject	103000836 - Data Management And Knowledge In Health
No of credits	4 ECTS
Type	Optional/elective
Academic year of 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 - E.T.S. De Ingenieros Informáticos
Academic year	2025-26

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.

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
Sergio Paraiso	sergio.paraiso@upm.es	ETSIII
Raul Alonso Calvo	ralonso@infomed.dia.fi.upm.es	ETSII

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

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

CE-CD06 - Capacidad para extraer, integrar y consultar datos heterogéneos en diferentes escenarios

CE-CD08 - Capacidad para utilizar y seleccionar las herramientas más adecuadas para deep learning

CE-HMDA06 - Capacidad para extraer, integrar y consultar datos heterogéneos en escenarios clínicos

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

CE-HMDA09 - Ser capaz de aplicar los métodos y tecnologías actuales en análisis de datos para su integración en el campo de la salud

CG03 - La capacidad de usar la lengua inglesa de manera competente, es decir, con capacitación para tareas complejas de trabajo y estudio.

CG05 - Comprensión de los principios de la gestión de proyectos, riesgo y cambio, así como poseer la capacidad de aplicar metodologías y procesos para gestionar proyectos y mitigar los riesgos.

3.2. Learning outcomes

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.

* 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 1960s 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. Artificial Intelligence is a key topic in this regard.

There will be a short survey of bioinformatics techniques, from a practical perspective, and of Artificial Intelligence, including recent developments related to Large Language Models and their applications in medicine.

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.

IMPORTANT NOTE: the course is focused on MEDICAL INFORMATICS, NOT BIOINFORMATICS OR CLINICAL BIOINFORMATICS. A short overview of bioinformatics is provided but the focus of the course is on medical informatics issues and applications. These two areas are in fact areas that correspond to whole titles of BSc and MSc, so some concrete, significant areas are shown, but it is not possible to provide an extended overview of both disciplines

4.2. Syllabus

1. Introduction to the course
2. Data, information and knowledge: concepts and foundations
3. Databases, data integration and standards: techniques and concepts
4. Electronic health records and Real World data
5. Artificial Intelligence in Biomedicine: basics
6. Data and text mining
7. Bioinformatics: basis concepts and techniques

5. Schedule

5.1. Subject schedule*

Week	Type 1 activities	Type 2 activities	Distant / On-line	Assessment activities
1	Introduction Duration: 02:00 Lecture		Use of distance learning may be necessary if there were special circumstances. Instructions will be provided by the university Duration: 00:00 Lecture	
2	Data, information and knowledge in biomedicine Duration: 02:00 Lecture		Use of distance learning may be necessary if there were special circumstances. Instructions will be provided by the university Duration: 00:00 Lecture	
3	Databases and structures for research and practice in biomedicine Duration: 02:00 Lecture		Use of distance learning may be necessary if there were special circumstances. Instructions will be provided by the university Duration: 00:00 Lecture	
4	Artificial intelligence in biomedicine: medical reasoning and foundations Duration: 02:00 Lecture		Use of distance learning may be necessary if there were special circumstances. Instructions will be provided by the university Duration: 00:00 Lecture	
5	Artificial intelligence in biomedicine: medical decision support Duration: 02:00 Lecture		Use of distance learning may be necessary if there were special circumstances. Instructions will be provided by the university Duration: 00:00 Lecture	
6	Biomedical vocabularies and standards I Duration: 02:00 Lecture		Use of distance learning may be necessary if there were special circumstances. Instructions will be provided by the university Duration: 00:00 Lecture	
7	Biomedical vocabularies and standards II Duration: 02:00 Lecture		Use of distance learning may be necessary if there were special circumstances. Instructions will be provided by the university Duration: 00:00 Lecture	

8	Electronic Health Records and Real World Data management I Duration: 02:00 Lecture		Use of distance learning may be necessary if there were special circumstances. Instructions will be provided by the university Duration: 00:00 Lecture	
9	Presentation of assignments Duration: 02:00 Additional activities		Use of distance learning may be necessary if there were special circumstances. Instructions will be provided by the university Duration: 00:00 Lecture	Presentation of first assignment Group presentation Progressive assessment Presential Duration: 02:00
10	Electronic Health Records and Real World Data management II Duration: 02:00 Lecture		Use of distance learning may be necessary if there were special circumstances. Instructions will be provided by the university Duration: 00:00 Lecture	
11	Integration and interoperability for health data and knowledge sources Duration: 02:00 Lecture		Use of distance learning may be necessary if there were special circumstances. Instructions will be provided by the university Duration: 00:00 Lecture	
12	Bioinformatics applications in biomedicine. Techniques and applications for data sequence processing and analysis. Sequence alignment. Clinical applications Duration: 02:00 Lecture		Use of distance learning may be necessary if there were special circumstances. Instructions will be provided by the university Duration: 00:00 Lecture	
13	Bioinformatics applications in biomedicine. Techniques and applications for data sequence processing and analysis. Sequence alignment. Clinical applications Duration: 02:00 Lecture		Use of distance learning may be necessary if there were special circumstances. Instructions will be provided by the university Duration: 00:00 Lecture	
14	Presentation of assignments Duration: 02:00 Additional activities		Use of distance learning may be necessary if there were special circumstances. Instructions will be provided by the university Duration: 00:00 Lecture	Presentation of second assignment Group presentation Progressive assessment Presential Duration: 02:00
15				
16				A final assignment/examination that will include topics from the two regular assignments Individual work Global examination Not Presential Duration: 02:00
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.

6. Activities and assessment criteria

6.1. Assessment activities

6.1.1. Assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
9	Presentation of first assignment	Group presentation	Face-to-face	02:00	50%	3 / 10	CB06 CB07 CB08 CB09 CE-CD06 CE-HMDA09 CE-HMDA06 CE-HMDA07
14	Presentation of second assignment	Group presentation	Face-to-face	02:00	50%	3 / 10	CE-HMDA06 CE-HMDA07 CG03 CG05 CE-CD08 CB06 CE-HMDA09

6.1.2. Global examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
16	A final assignment/examination that will include topics from the two regular assignments	Individual work	No Presential	02:00	100%	5 / 10	CB08 CB09 CE-CD06 CB06 CB07 CE-HMDA09 CE-HMDA06 CE-HMDA07 CG03 CG05 CE-CD08

6.1.3. Referred (re-sit) examination

No se ha definido la evaluación extraordinaria.

6.2. Assessment criteria

Presentations of assignments 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 through Internet and 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

8. Other information

8.1. Other information about the subject

Please, refer to the section of the Themes of the course to remind that this course is mostly focused on medical informatics and not bioinformatics.