ANX-PR/CL/001-01

LEARNING GUIDE

SUBJECT

103000840 - Devices And Biometric Applications For E-health

DEGREE PROGRAMME

10AZ - Master Universitario En Innovación Digital

ACADEMIC YEAR & SEMESTER

2024/25 - Semester 1

Index

Learning guide

1. Description

1.1. Subject details

Name of the subject	103000840 - Devices And Biometric Applications For E-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	2024-25

2. Faculty

2.1. Faculty members with subject teaching role

Name and surname	Office/Room	Email	Tutoring hours *
Agustin Alvarez Marquina (Subject coordinator)	4211	agustin.alvarez@upm.es	Sin horario. Please, ask for an appointment.
Rafael Martinez Olalla	4208	rafael.martinezo@upm.es	Sin horario. Please, ask for an appointment.

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

3. Skills and learning outcomes *

3.1. Skills to be learned

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

CE-HMDA04 - Capacidad para aplicar métodos avanzados para clasificación, modelado, segmentación y predicción a partir de un conjunto de datos

CG07 - Capacidad de trabajar y comunicarse también en contextos internacionales.

3.2. Learning outcomes

RA9 - Analyse qualitative data to specify the design requirements related to the context of use

RA7 - Understand how to design an interactive system using a user-centred approach

RA8 - Run different qualitative techniques to study the context of use (user, tasks, and environment) of an interactive system

* 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

This course will introduce students into the basics of e-health applications from the point of view of device built-in sensors and focused in biometric data analysis useful for patient monitoring. Basic procedures for sensor managing for synchronous and/or asynchronous mode of operation in mobile, wearable and IoT devices will be presented. Finally, application development for different scenarios in the health domain will be reviewed.

4.2. Syllabus

1. Introduction: from devices to medical related applications.

2. Biometric signals and e-Health.

    2.1. Signals form common devices (e.g. mobile phones, smart wearables).

        2.1.1. Voice/speech.

        2.1.2. Gyroscope/Accelerometer data analysis.

    2.2. Medical oriented devices.

        2.2.1. Glucose scan.

        2.2.2. ABG reading.

        2.2.3. Holter monitor.

3. IoT & edge computing for e-Health.

    3.1. Edge computing resources.

    3.2. Cloud platforms for IoT.

4. Mobile application development.

    4.1. Review of main applications.

    4.2. APIs for sensor & dedicated devices.

    4.3. Sensor data acquisition.

    4.4. Data filtering and preparation.

    4.5. User interfaces.

5. Schedule

5.1. Subject schedule*

Week	Type 1 activities	Type 2 activities	Distant / On-line	Assessment activities
1	**1. Introduction: from devices to medical related applications.** Duration: 02:00 Lecture			
2	**1. Introduction: from devices to medical related applications.** Duration: 02:00 Lecture			**Homework.** Online test Progressive assessment Not Presential Duration: 00:00
3	**2. Biometric signals and e-Health.** Duration: 02:00 Lecture			
4		**2. Biometric signals and e-Health.** Duration: 02:00 Laboratory assignments		**Homework.** Online test Progressive assessment Not Presential Duration: 00:00
5		**2. Biometric signals and e-Health.** Duration: 02:00 Laboratory assignments		
6		**2. Biometric signals and e-Health.** Duration: 02:00 Laboratory assignments		**Homework.** Online test Progressive assessment Not Presential Duration: 00:00
7		**2. Biometric signals and e-Health.** Duration: 02:00 Laboratory assignments		
8	**3. IoT & edge computing for e-Health.** Duration: 02:00 Lecture			**Homework.** Online test Progressive assessment Not Presential Duration: 00:00
9		**3. IoT & edge computing for e-Health.** Duration: 02:00 Laboratory assignments		
10		**3. IoT & edge computing for e-Health.** Duration: 02:00 Laboratory assignments		
11		**3. IoT & edge computing for e-Health.** Duration: 02:00 Laboratory assignments		

12	**4. Mobile application development.** Duration: 02:00 Lecture			
13		**4. Mobile application development.** Duration: 02:00 Laboratory assignments		
14		**4. Mobile application development.** Duration: 02:00 Laboratory assignments		
15	**Project presentation.** Duration: 02:00 Cooperative activities			**Project assignment.** Group work Progressive assessment Not Presential Duration: 00:00 **Project presentation.** Group presentation Progressive assessment Presential Duration: 02:00
16				
17				**Homework.** Online test Global examination Not Presential Duration: 00:00 **Project assignment.** Group work Global examination Not Presential Duration: 00:00 **Project presentation.** Group presentation Global examination Presential Duration: 02:00

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
2	Homework.	Online test	No Presential	00:00	30%	0 / 10	CB07 CE-HMDA04
4	Homework.	Online test	No Presential	00:00	30%	0 / 10	CB07 CE-HMDA04
6	Homework.	Online test	No Presential	00:00	30%	0 / 10	CB07 CE-HMDA04
8	Homework.	Online test	No Presential	00:00	30%	0 / 10	CB07 CE-HMDA04
15	Project assignment.	Group work	No Presential	00:00	40%	0 / 10	CB07 CE-HMDA04
15	Project presentation.	Group presentation	Face-to-face	02:00	30%	0 / 10	CG07

6.1.2. Global examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
17	Homework.	Online test	No Presential	00:00	30%	0 / 10	CB07 CE-HMDA04
17	Project assignment.	Group work	No Presential	00:00	40%	0 / 10	CB07 CE-HMDA04
17	Project presentation.	Group presentation	Face-to-face	02:00	30%	0 / 10	CG07

6.1.3. Referred (re-sit) examination

Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
Final exam.	Written test	Face-to-face	00:30	40%	0 / 10	CB07 CE-HMDA04

Project assignment.	Group work	Face-to-face	00:00	40%	0 / 10	CB07 CE-HMDA04
Project presentation.	Group presentation	Face-to-face	02:00	30%	0 / 10	CG07

6.2. Assessment criteria

PROGRESSIVE ASSESSMENT GRADING

A minimum grade of 5.0 over a total of 10 is requiered for completing the course.

GRADE = 30% Homework + 40% Project written report + 30% Project oral presentación.

REFERRED EXAMINATION

A minimum grade of 5.0 over a total of 10 is requiered for completing the course.

GRADE = 30% Final exam + 40% Project written report + 30% Project oral presentación.

7. Teaching resources

7.1. Teaching resources for the subject

Name	Type	Notes
Mobile Health: Sensors, Analytic Methods, and Applications, James M. Rehg (Editor), Susan A. Murphy (Editor), Springer, 2017, ISBN: 9783319513935	Bibliography	
The Digital Signal Processing Handbook, V. K. Madisetti, Handbook of Multisensor Data Fusion: Theory and Practice (2nd Edition), Martin Liggins II, David Hall, James Llinas, CRC Press, 2008, ISBN 9781420053081.	Bibliography	
Data Science for Healthcare. Methodologies and Applications, Consoli, Sergio, Reforgiato Recupero, Diego, Petkovic, Milan (Eds.), Springer, 2019, ISBN: 9783030052485.	Bibliography	

8. Other information

8.1. Other information about the subject

This subject is not offered in the current year.