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

2022/23 - 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	2022-23

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

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

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

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

12	**4. Mobile application development.** Duration: 02:00			
13		**4. Mobile application development.** Duration: 02:00		
14		**4. Mobile application development.** Duration: 02:00		
15	**Project presentation.** Duration: 02:00			**Project assignment.** Continuous assessment Not Presential Duration: 00:00 **Project presentation.** Continuous assessment Presential Duration: 02:00
16	**Project presentation.** Duration: 02:00			**Project assignment.** Continuous assessment Not Presential Duration: 00:00 **Project presentation.** Continuous assessment Presential Duration: 02:00
17				**Homework.** Final examination Not Presential Duration: 00:00 **Project assignment.** Final examination Not Presential Duration: 00:00 **Project presentation.** Final 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.

* 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. Assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
2	Homework.		No Presential	00:00	30%	0 / 10	CE-HMDA04 CB07
4	Homework.		No Presential	00:00	30%	0 / 10	CB07 CE-HMDA04
6	Homework.		No Presential	00:00	30%	0 / 10	CB07 CE-HMDA04
8	Homework.		No Presential	00:00	30%	0 / 10	CB07 CE-HMDA04
15	Project assignment.		No Presential	00:00	40%	0 / 10	CB07 CE-HMDA04
15	Project presentation.		Face-to-face	02:00	30%	0 / 10	CG07
16	Project assignment.		No Presential	00:00	40%	0 / 10	CB07 CE-HMDA04
16	Project 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.		No Presential	00:00	30%	0 / 10	CE-HMDA04 CB07
17	Project assignment.		No Presential	00:00	40%	0 / 10	CB07 CE-HMDA04
17	Project 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.		Face-to-face	00:30	40%	0 / 10	CB07 CE-HMDA04

Project assignment.		Face-to-face	00:00	40%	0 / 10	CB07 CE-HMDA04
Project 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	