Teaching guide [Codi UD] – [Sigles UD] – Digital Health and Mobile Health (mHealth) Apps

Responsible unit:	Barcelona East School of Engineering			
Unit taught:	*707 - ESAII - Department of Systems Engineering, Automation and Industrial Informatics*			
Course	2025-2026	**Créditos ECTS**	6.0	
Languages: Castellano				

TEACHING STAFF

Responsible teachers :	Daniel Romero Pérez
Other:	Daniel Romero Pérez

PREVIOUS CAPABILITIES

- Basic knowledge of programming and databases
- Fundamentals of Statistics

TEACHING METHODOLOGIES

AF.1.- Presentation of theoretical contents.
AF.4.- Discussion of scientific problems or articles.
AF.6.- Carrying out individual and cooperative work.
AF.7. Sessions in computer or simulation laboratories

LEARNING OBJECTIVES OF THE COURSE

The objective is to introduce the student to the Digital Health and mHealth systems, exploring their impact on the transformation of the health sector. Students will analyze key technologies in mHealth such as wearables, mobile apps, telemedicine and artificial intelligence, and learn how to design and evaluate mHealth applications that are usable, accessible and secure. In addition, they will acquire skills in the analysis of digital health data to improve clinical decision-making and will learn about the regulatory framework and ethical challenges associated with the development and implementation of mHealth solutions.

TOTAL HOURS OF STUDENT DEDICATION

Types	Hours	Percentage
Hours of directed activities	24	16.00 %
Large group hours	30	20.00 %
Small Group Hours	6	4.00 %
Autonomous learning hours	90	60.00 %
Total dedication: 150 h		

CONTENTS

Topic 1: Introduction to Digital Health and mHealth

Description:

- Fundamental concepts: eHealth, mHealth, telemedicine.
- Evolution of mHealth, potential and limitations.
- Regulatory and normative framework.

Dedication: 18 h
Large group/Theory: 2 h
Autonomous learning: 16 h

Topic 2: Key Technologies in mHealth

Description:

- Mobile devices: smartphones, tablets, wearables
- Health mobile applications (Apps).
- Telemedicine and telehealth. Internet of Things (IoT) in healthcare.
- Artificial intelligence for efficient mHealth systems.
- Signal Processing and Machine Learning
- Big data and data analysis as a support for decision-making.

Related activities: Study of real cases of mHealth applications. Reading and discussion of scientific articles. Development of individual or group projects.
Dedication: 44 h Large group/Theory: 10 h Small group/practice: 2 hrs Supervised activities: 8 h Autonomous learning: 24 hours

Topic 3:	**Clinical Applications of mHealth**
Description: - Sensors for mHealth systems - Remote patient monitoring and digital diagnosis: telemedicine, telemonitoring. - Management of chronic diseases: diabetes, hypertension, respiratory diseases. - Public health: health campaigns, epidemiological surveillance.	
Related activities: Integration of medical devices (sensors, wearables) with mHealth applications. Development of prototypes for simplified versions of mHealth applications. Development of individual or group projects.	
Dedication: 38 h Large group/Theory: 8 h Small group/practice: 2 hrs Supervised activities: 8 h Autonomous learning: 20 h	

Topic 4:	mHealth Application Development
Description: - Life cycle of health software development. - Development platforms: iOS, Android. - User-centered design. - Mobile app evaluation.	
Related activities: Creation of interactive health data visualization panels. Design of intuitive and engaging user interfaces (UI) and user experience (UX). Development of individual or group projects	
Dedication: 38 h Large group/Theory: 8 h Small group/practice: 2 hrs Supervised activities: 8 h Autonomous learning: 20 h	

Topic 5:	Challenges and Opportunities of mHealth
Description: - Data privacy and security. - System interoperability. - Acceptance by users and health professionals. - Socioeconomic impact of mHealth - Ethics and legal aspects.	
Related activities:	
Dedication: 12 h Large group/Theory: 2 h Supervised activities: 0 h Autonomous learning: 10 h	

EVALUATION SYSTEM

Evaluation of Directed Activities (AD) = 30%
Project Evaluation (NP) = 30%
Examen Final (EF) = 40%
Nota final (Nf): 0.30*AD + 0.30*NP + 0.40*EF

Specification

1. There will be evaluation of activities (face-to-face or non-face-to-face) corresponding to the delivery and discussion of proposed works (type AD). These can be individual or in groups, according to the criteria of each teacher.
2. There will be a final exam (Ef) of a maximum duration of 2 hours, which will consist of questions related to theoretical knowledge of the subject syllabus and aimed at assessing the learning objectives achieved by the student.

There will be no re-evaluation exam in this subject.

BIBLIOGRAPHY

Bàsica:

Woodward, Bryan. "M-Health: Fundamentals and Applications: Fundamentals and Applications." [en línea]. Hoboken, New Jersey: John Wiley & Sons, 2011 [Consulta: 10/02/2025]. Disponible a: https://onlinelibrary.wiley.com/doi/book/10.1002/9781119302889.
Ogrodnik, Peter J.. Medical device design: innovation from concept to market [en línea]. 2nd ed. Oxford: Academic Press-Elsevier, 2020 [Consulta a: 10/02/2025]. Disponible en https://www-sciencedirect-com.recursos.biblioteca.upc.edu/book/9780128149621/medical-device-design

Complementary:

- Moumtzoglou, Anastasius, ed. *M-health Innovations for Patient-centered Care*. IGI Global, 2016.
- Topol, E. *The patient will see you now: the future of medicine is in your hands*. Basic Books. 2015

RESOURCES

Other resources:

Class material available to ATENEA