Universidad Rey Juan Carlos

TEACHING GUIDE

HEALTH INFORMATION SYSTEMS

GRADO EN INGENIERÍA BIOMÉDICA (INGLÉS) (3º y 4º curso) (2374)

ACADEMIC YEAR 2026-27

Q2803011B UNIVERSIDAD REY JUAN CARLOS
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I.-Subject Identification	
Type	OBLIGATORIA
Teaching period	3 course, 2Q semester
Nº of credits	6
Language in wich the subject is taught	English

II.-Presentation

This course is an introduction to the field of Health Information Systems and the technologies that support the management and delivery of healthcare services. It provides an overview of the main information systems used in healthcare organisations, their structure, functionality and integration within healthcare environments. The course also introduces healthcare data management, information models, standards and interoperability concepts that enable the exchange and use of information across different systems and organisations. During this subject, students will learn about the operation of healthcare information systems, the principles of healthcare data representation and standardisation, and the role of information technologies in supporting clinical and administrative processes. Particular attention is given to interoperability, healthcare networks and the organisation of information systems at regional, national and international levels.
In short, the student who passes the course will acquire a theoretical and practical cross-sectional knowledge of the information systems and technologies that support modern healthcare organisations, which will be of great value in the development of their professional career.

III.-Learning outcomes

CG01 . Analyze and synthesize problems related to biomedical engineering, solve them and communicate them efficiently.
CB5 . That students have developed the learning skills needed to undertake further studies with a considerable degree of autonomy.
CE04. Solve mathematical problems that may arise in biomedical engineering by applying knowledge and concepts related to optimization.
CE19. Use the fundamentals of programming for the development of computer programs in modern programming languages, as well as to understand and use different operating systems, databases and hospital information systems. To apply them in networks, systems and telematic services for hospital management.
CE20. Use and design information and communication systems in health and biomedicine.
CE21 . Extract biomedical data from its environment, including knowledge of medical consultation systems, and information standards in medical equipment.

- Key for degrees not adapted to RD 822/21: **CB** - basic competences, **CG** - generic competences, **CE** - specific competences, **CT** - transversal competences.
- Key for degrees adapted to RD 822/21: **CON** - knowledge, **COM** - competences, **HAB** - skills.

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IV.-Contents

IV.A.-Syllabus

Block 1. Health Information Systems Ecosystem

•1.1. Introduction to Health Information Systems.

•1.2. Electronic Health Records: OpenMRS and Open-Source vs Commercial Solutions.

•1.3. Healthcare Departmental Systems, Primary Care and Epidemiology.

Block 2. Interoperability and Structured Representation of Clinical Information

•2.1. Interoperability and its dimensions

•2.2. DICOM standard, RIS and PACS

•2.3. HL7 standards: v2, v3, CDA and FHIR

•2.4. Data models, ontologies, archetypes, ISO/EN 13606 and openEHR

Block 3. Coding, Classification and Exploitation of Clinical and Administrative Data

•3.1. SNOMED CT and LOINC coding

•3.2. ICD-10 coding, CMBD theory and DRGs

•3.3. CMBD formulas, analysis and practical problems

Block 4. Healthcare Management, Continuity of Care, Institutional Projects and Specialised Systems

•4.1. Resource management and hospital networks

•4.2. Institutional projects. HCDSNS, RESNS and epSOS (MyHealth@EU).

•4.3. The empowerment of the citizen. Personal health record.

•4.4. Applications in biomedical research. Radiotherapy information systems and LINAC control systems

IV.B.-Training activities

Type	Title
Theoretical sessions	Attend lectures where students listen to the professor's presentations, ask questions, and actively take notes.
Practical sessions	Attendance at practical classes under faculty supervision, in computer labs or specialized laboratories.
Academic tutorials	Attendance at sessions designed to address questions about certain course content or activities, upon the student's request.
Other activities	Attending seminars, workshops, courses, and lectures, and watching videos.
Realización de Pruebas	Attendance at and completion of in-class assessment tests.

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V.-Student workload	
Theoretical sessions	32
Resolution of exercises, problems, case studies, etc.	5
Practical sessions in experimental, technological and clinical laboratories, fieldwork, etc.	18
Tests and/or exams	5
Academic tutorials	9
Related activities: conferences, seminars, etc.	39
Preparation of theoretical sessions and self-study	20
Preparation of practical tasks, exercises, case studies, projects, etc.	20
Preparation for tests and/or exams	32
Total student workload	180

VI.-Methodology and academic programme

Type	Period	Content
Theoretical sessions	Week 1 to Week 3	Lectures for Block 1
Practical sessions	Week 3 to Week 4	Practices for Block 1
Theoretical sessions	Week 4 to Week 8	Lectures for Block 2
Practical sessions	Week 5 to Week 9	Practices for Block 2
Tests and/or exams	Week 8 to Week 8	Midterm Exam
Theoretical sessions	Week 9 to Week 10	Lectures for Block 3
Practical sessions	Week 11 to Week 11	Practices for Block 3
Theoretical sessions	Week 12 to Week 14	Lectures for Block 4
Other activities	Week 14 to Week 15	Attending seminars, workshops, courses, and lectures, and watching videos.

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VII.-Assessment methods
The general assessment method is continuous as established in the *Regulation for the Assessment of Learning Outcomes* of Rey Juan Carlos University. All the assessment systems established in the degree report must be employed, except for those that have a minimum weight of 0%, which can be used by professors in the academic years they consider relevant. Each assessment system may be applied through one or more assessment activities, consistent with the system. No assessment activity can exceed individually 60% of the overall grade for the subject. The sum of non re-evaluable activities cannot exceed 40% of the overall grade for the subject and, in general, should not have an established minimum grade (except for practical activities in which, strictly speaking, the conditions of the ordinary call cannot be reproduced in the extraordinary call). Those students who do not manage to pass the subject in the ordinary call, or do not attend this first call, may attend the extraordinary call only for failed re-evaluable assessment activities. The distribution and characteristics of the assessment activities are described below.
VII.A.-Description and weight of the assessment activities

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Ordinary Assessment

The ordinary assessment will be based on the following components:

- **Midterm exam** covering the theoretical and practical concepts addressed during the first part of the course (30% of the mark). A minimum mark of 5 out of 10 is required in order for this to be averaged with the other assessment activities. This assessment activity can be retaken in the extraordinary examination period.
- **Final exam** covering the theoretical and practical concepts addressed during the second part of the course (40% of the mark). A minimum mark of 5 out of 10 is required in order for this to be averaged with the other assessment activities. This assessment activity can be retaken in the extraordinary examination period.
- Four **practical assignments** carried out during the course (20% of the mark, each accounting for 5%). Each practical assignment will be assessed through a structured online report on the Virtual Classroom platform, including completion tasks, completion questions, and multiple-choice questions. If the report is not submitted by the deadline, the grade for that report will be 0.0. A minimum average mark of 5 out of 10 is required in order for this to be averaged with the other assessment activities. This assessment activity can be retaken in the extraordinary examination period.
- Four **multiple-choice tests** conducted throughout the term (10% of the mark, each accounting for 2.5%). Each test will correspond to one of the theoretical blocks that comprise the course. This assessment activity cannot be retaken in the extraordinary examination period and does not require a minimum mark.

To pass the course, students must obtain an overall final grade of at least **5 out of 10**. In addition, all assessment activities that can be retaken must reach their respective minimum marks. If one or more of these activities do not reach the minimum required mark but the weighted average grade is higher than **4.5 out of 10**, the final grade recorded will be **4.5 out of 10**.

Extraordinary Assessment

The ordinary assessment will be based on the following components:

- **Midterm exam** covering the theoretical and practical concepts addressed during the first part of the course (30% of the mark). A minimum mark of 5 out of 10 is required in order for this to be averaged with the other assessment activities.
- **Final exam** covering the theoretical and practical concepts addressed during the second part of the course (40% of the mark). A minimum mark of 5 out of 10 is required in order for this to be averaged with the other assessment activities.
- Four **practical assignments** (20% of the mark, each accounting for 5%). Each practical assignment will be assessed through a structured online report on the Virtual Classroom platform, including completion tasks, completion questions, and multiple-choice questions. A minimum average mark of 5 out of 10 is required in order for this to be averaged with the other assessment activities.

Any assessment component for which the student obtained a mark of **5 out of 10 or higher** during the ordinary assessment period will be retained for the extraordinary assessment period. Therefore, students will only be required to retake the assessment components that were not passed.

As in the ordinary assessment, if one or more recoverable components do not reach the minimum required mark but the weighted average grade is higher than **4.5 out of 10**, the final grade recorded will be **4.5 out of 10**.

Review of Written Examinations

The following rules apply to the review of marks obtained in written examinations:

1. A review session will be scheduled in the days following each written examination. Students wishing to request a review of their marks must attend the corresponding session. Failure to attend will result in the loss of the right to request a review, except in duly justified circumstances (e.g., medical reasons or illness).
2. The assessment criteria and marking schemes established by the lecturers of the course shall not be subject to discussion during the review process.

VII.B. Assessment of students with academic exemption from class attendance

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Having Academic Exemption from Class Attendance (DAAC) does not imply that students are automatically exempt from participating in the continuous assessment activities or in the training activities of compulsory attendance as established in the teaching guide. Once the exemption has been granted, students must contact the subject's teaching staff, who will propose the adaptations he/she may consider relevant, as long as they guarantee the acquisition and adequate assessment of the learning goals established. Students must maintain adequate communication with the teaching staff so that they may provide information on the dates for training and assessment activities, if these are not established in the programme and available for students at the time of achieving the exemption.
Subject with possibility of academic exemption: Yes.

VII.C. Review of assessment activities

In accordance with the Regulation for the Assessment of Learning Outcomes of Rey Juan Carlos University.

VII.D.-Students with a disability or special educational needs

In order to guarantee equal opportunities, non-discrimination, universal accessibility and academic success, students with disabilities or especial education needs may request curricular adaptations to follow their studies. These adaptations will be provided by the Unit of Attention to People with Disabilities of Rey Juan Carlos University, in accordance with the regulation which regulates the service for the Attention of People with Disabilities at the University. This Unit will issue a report for curricular adaptations, so that students with disabilities or special education needs must contact the service (at e-mail discapacidad.programa@urjc.es) in order to provide relevant information for different educational alternatives.

VII.E.-Academic behaviour, academic integrity and honesty

Rey Juan Carlos University is fully committed to the highest standards of academic integrity and honesty, so studying at the URJC means assuming and subscribing to the values of integrity and academic honesty set out in the University's Ethical Code. To support this process, the University has Rey Juan Carlos University's Academic Conduct Regulation as well as different tools (anti-plagiarism, supervision...) that offer a collective guarantee for the full development of these essential values.

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VIII.-Teaching resources and materials
Basic bibliography
Electronic Health Records For Dummies. Trenor Williams; Anita Samarth. Practical guide to clinical computing systems: design, operations, and infrastructure. Payne, Thomas H, 2008. Essentials of health information systems and technology, Balgrosky, Jean A, 2015. E-health care information systems: an introduction for students and professionals, Tan, Joseph K. H, 2005
Consultation bibliography

IX.-Professors	
Name and surname	EVA MILARA HERNANDO
E-mail address	eva.milara@urjc.es
Department	Teoría de la Señal y Comunicaciones y Sistemas Telemáticos y Computación
Campus	Fuenlabrada
Category	Profesor/a Ayudante Doctor/a
Academic degree	Doctor
Person responsible for the subject	Yes
Tutorial timetable	Para consultar las tutorias póngase en contacto con el/la profesor/a a través de correo electrónico
Number of quinquennia	0
Number of sexennia	0
No. of positive evaluations by Docentia	0

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