

Standards in eHealth and Interoperability

Code: 44020
ECTS Credits: 6

Degree	Type	Year	Semester
4316624 Internet of Things for e-Health	OB	0	1

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

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Use of Languages

Principal working language: english (eng)

Other comments on languages

English-only course

Teachers

Joan Bartrina Rapesta

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Prerequisites

There are no formal prerequisites.

Objectives and Contextualisation

The goal of this subject is to provide an introduction to standards, communication protocols and security protocols concerning Internet-of-Things for E-Health (IoT-eH). Successful students will acquire skills required to make informed decisions regarding the infrastructure of IoT-eH systems. Part of those skills involve researching the state of the art and comparing available options. Others will focus on properly conveying all relevant information regarding decisions made under several communicative circumstances.

Competences

- Apply basic research tools in the area of IoT in health.
- Apply the ethical rules applicable in the health sector.
- Apply the local, autonomic, national and international regulations in the area of IoT in health.
- Apply the operation and organisation of internet, communications technologies and protocols and new generation networks to the area of health and health provision.
- Communicate and justify conclusions clearly and unambiguously to both specialist and non-specialist audiences.
- Identify care procedures in the health system and the factors for their digital transformation to a more efficient model for professionals and patients.

- Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.

Learning Outcomes

1. Analyse and evaluate the requirements of communication technologies and protocols.
2. Apply basic research tools in the area of IoT in health.
3. Apply the local, autonomic, national and international regulations in the area of IoT in health.
4. Communicate and justify conclusions clearly and unambiguously to both specialist and non-specialist audiences.
5. Identify the standards that facilitate the acceleration of digital transformation towards a more efficient relationship model for professionals and patients.
6. Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
7. Understand protocolised healthcare procedures through standard healthcare and health-system procedures.
8. Understand the processes of product standardisation and certification.
9. Use the corresponding ethics committees in the health sector for approving studies, procedures and developments.

Content

1. Emerging Trends in Electronic Health Care
2. E-health Standards Institutions
3. HL7: Electronic Health Information Systems
4. DICOM: Digital Imaging and Communications in Medicine
5. Communication standards: JPEG
6. Communication standards: JPEG-LS
7. Communication standards: JPEG2000
8. Digital Video Compression Standards
9. Communications standards: H.264
10. Standards for Privacy, Security and Safety
11. Building blocks for Information Security
12. Communication systems for IoT
13. Wireless networks
14. Opportunistic Networking

Methodology

The methodology of this course is designed to expose the students to some of the most important concepts in the area of IoT-eH.

Different learning formats will be used in the presential lectures, including:

- Analysis of the literature

- Discussion of practical cases
- Presentation and defense of decisions related to standards in IoT

Autonomous student work will be required before each session, including independent literature research and preparation of written submissions and oral presentations. Active participation in class will be required for all formats to enhance learning outcomes for all course participants. Positive interactions and contributions in class will be rewarded in the final course grades.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Presential sessions	30	1.2	1, 3, 2, 7, 8, 5, 6, 4, 9
Type: Supervised			
Presential supervised sessions	15	0.6	1, 3, 2, 7, 8, 5, 6, 4, 9
Type: Autonomous			
Homework: resolution of exercises, reading of journal papers or technical reports, preparation of sessions	35	1.4	1, 3, 2, 7, 8, 5, 6, 4, 9
Preparation of oral assignments	25	1	1, 3, 2, 7, 8, 5, 6, 4, 9
Preparation of written assignments	25	1	1, 3, 2, 7, 8, 5, 6, 4, 9
Study for synthesis test	15	0.6	1, 3, 2, 7, 8, 5, 6, 4, 9

Assessment

Final course marks will be based on each student portfolio, and computed as follows:

- Active preparation and participation in sessions: 2 points.

Students must be able to provide evidence of participation in presential lectures, e.g., by sharing acquired knowledge and participating in group discussions. Failure to provide such evidence (e.g., by non attendance or by not participating) will result in a 0% score in this part and automatic failure of the course. A minimum of 50% (1 point) in this part will be required to pass the course.

- Assignments: 6 points.

Students will be given written and oral assignments that must be submitted/delivered before specific deadlines that will be made public in class. Scoring of this part will be as follows:

- Written documents: 3 points
- Oral presentations: 3 points.

Failure to submit/deliver them will result in a 0% score in this part and automatic failure of the course. A minimum of 2 points is required for the written and for the oral parts separately. Correct usage of the English language is mandatory for both parts.

- Synthesis written test: 2 points.

A final synthesis test will be given based on the contents discussed during the course sessions. A minimum score of 50% (1 point) in this part is required to pass the course.

The minimum score for each part must be met in order to pass the course. Otherwise, a final score of 3 out of 10 will be assigned.

Notwithstanding other disciplinary measures deemed appropriate, and in accordance with the academic regulations in force, assessment activities will receive a zero whenever a student commits academic irregularities that may alter such assessment. Assessment activities graded in this way and by this procedure will not be re-assessable. If passing the assessment activity or activities in question is required to pass the subject, the awarding of a zero for disciplinary measures will also entail a direct fail for the subject, with no opportunity to re-assess this in the same academic year. Irregularities contemplated in this procedure include, among others:

- the total or partial copying of a practical exercise, report, or any other evaluation activity;
- allowing others to copy;
- presenting group work that has not been done entirely by the members of the group;
- presenting any materials prepared by a third party as one's own work, even if these materials are translations or adaptations, including work that is not original or exclusively that of the student;
- having communication devices (such as mobile phones, smart watches, etc.) accessible during theoretical-practical assessment tests (individual exams), when prohibited

An overall grade of 5 or higher is required to pass the subject. A "non-assessable" grade cannot be assigned to students who have participated in any of the individual partial tests or the final exam. No special treatment will be given to students who have completed the course in previous academic years. The grade in the Transcript of Records (ToR) will be the lowest value between 3.0 and the weighted average grade, in the event of irregularities having been committed for any assessment activity (and therefore re-assessment will not be possible).

It is important to bear in mind that no assessment activities will be permitted for any student at a different date or time to that established, unless for justified causes duly advised before the activity and with the lecturer's previous consent. In all other cases, if an activity has not been carried out, this cannot be re-assessed.

To consult the academic regulations approved by the Governing Council of the UAB, please follow this link: http://webs2002.uab.es/afers_academics/info_ac/0041.htm

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Oral presentations	30%	1	0.04	1, 3, 2, 7, 8, 5, 6, 4, 9

Participation in class: preparation, contributions and discussion	20%	2	0.08	1, 3, 2, 7, 8, 5, 6, 4
Synthesis test	20%	1	0.04	1, 3, 2, 7, 8, 5, 6, 4, 9
Written deliverables	30%	1	0.04	1, 3, 2, 7, 8, 5, 6, 4, 9

Bibliography

1. Robert S. H. Istepanian and Swamy Laxminarayan and Constantinis S. Pattichis (2006). M-health: Emerging Mobile Health Systems, Springer Publisher. ISBN 978-0-387-26558-2.
2. David A. Clunie (2000). DICOM Structured Reporting. ISBN 097-0-13690-0
3. Thomas M. Cover and Joy A. Thomas (1991). Elements of Information Theory, John Wiley & Sons, Inc
Mark Nelson (1991). The Data Compression Book, Prentice Hall.
4. David S. Taubman and Michael W. Marcellin (2002). JPEG 2000, Kluwer Academic Publishers. ISBN 0-7923-7519-X.
5. David Salomon (2006, 4th Edition). Data Compression: The Complete Reference (Hardcover), Springer. ISBN 1-84628-602-5.
6. David Salomon, Giovanni Motta (2010, 5th Edition). Handbook of Data Compression (Hardcover), Springer. ISBN 978-1-84882-902-2.
7. Khalid Sayood (2012, 4th Edition). Introduction to Data Compression (Hardcover), Morgan Kaufmann. ISBN 978-0-12-415796-5.
8. Höller, Jan, David Boyle, Stamatis Karnouskos, Stefan Avesand, Catherine Mulligan, and Vlasios Tsiatsis. *From machine-to-machine to the internet of things*. Cambridge: Academic Press, 2014.
9. Denko MK, editor. Mobile Opportunistic Networks: Architectures, Protocols and Applications. CRC Press; 2016 Apr 19.
10. Pahlavan K, Krishnamurthy P. Principles of wireless networks: A unified approach. Prentice Hall PTR; 2011 Aug 30.

Software

No specific toolbox will be used. Practices may require knowledge of different programming languages as C, Java or Python.