COURSE DATA

DATA SUBJECT

Code: 36440
Name: Health data analytics
Cycle: Undergraduate Studies
ECTS Credits: 4.5
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1406 - Degree in Data Science	Escola Tècnica Superior d'Enginyeria	4	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1406 - Degree in Data Science	Health Data Analytics	ELECTIVES

COORDINATION

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SUMMARY

Data Analytics in Health is an optional subject in the first four-month period of the fourth year of the Degree in Data Science with a course load of 4.5 ECTS credits. The aim of the subject is to give value to the knowledge acquired throughout the degree and apply it to a field as important and transcendent for people as health. The approach is eminently practical and oriented towards demonstrating the capabilities of machine learning in supporting the decisions faced by clinical professionals and in the exploitation of the enormous amount of information that is collected in hospitals, pharmaceutical companies and biomedical research centres. We will complement the theoretical and practical laboratory classes with visits to hospitals and data centres and talks by specialists in the field of health.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

COMPETENCES / LEARNING OUTCOMES

1406 - Degree in Data Science

(CB3) Students must have the ability to gather and interpret relevant data (usually in their field of study) to make judgements that take relevant social, scientific or ethical issues into consideration.

(CB4) Students must be able to communicate information, ideas, problems and solutions to both expert and lay audiences.

(CE03) Ability to solve classification, modelling, segmentation and prediction problems from a set of data.

(CE12) Ability to design and start solutions based on data analysis in the field of medicine and business, taking into account the specific requirements of this type of use cases.

(CG05) Analysis and synthesis capability in the preparation of reports and in the defence of ideas.

(CG07) Ability to autonomously make decisions and to properly and originally elaborate reasoned arguments, in order to obtain reasonable and contrastable hypotheses.

(CT01) To be able to access (bibliographical) information tools and appropriately use them in the development of their daily tasks.

(CT02) To be able to complete technical, scientific, social and human training in general, and to organise self-learning with a high degree of autonomy.

DESCRIPTION OF CONTENTS

1. Data Analytics in Health

1.1. Data-driven knowledge
1.2. Types of data in health
1.3. Most common problems
1.4. Machine Learning Approach
1.5. Model Interpretability

2. Clinical Decision Support System

2.1. Characteristics of a CDSS
2.2. Action protocols. Rule-based systems
2.3. Public health information and surveillance systems
2.4. Influence diagrams for decision optimisation

3. Biomedical time-series modelling

3.1. Biomedical signals EOG, ECG, EMG, EEG
3.2. Biomedical signal analysis
3.3. Pharmacokinetics and pharmacodynamics

4. Clinical information systems

4.1. Digital health records (EHR)
4.2. Hospital information systems (HIS)
4.3. Medical Image Storage System (PACS)
4.4. Visiting a hospital data centre

5. Medical diagnostic imaging systems

5.1. Imaging methods in medical diagnosis
5.2. Medical equipment in Digital Radiography
5.3. Quality control methods for different imaging techniques
5.4. Information systems in the hospital environment: Data analysis and processing

6. Optimisation of resources

6.1. Improvement of hospital resources
6.2. Long-term optimisation

7. Laboratory practices

7.1. Clinical decision support system
7.2. Biomedical signal processing
7.3. Clinical information systems
7.4. Medical image analysis
7.5. Formative visit to a real clinical environment

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	26,00
Laboratory	15,00
Classroom practices	4,00
Total hours	**45,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	4,00
Individual or group project	12,00
Independent study and work	18,00
Preparation of lessons	11,50
Preparation for assessment activities	12,00
Resolution of case studies	10,00
Total hours	**67,50**

TEACHING METHODOLOGY

MD1 - Theoretical activities. Expository development of the subject with the participation of the student in the resolution of specific questions. Individual evaluation questionnaires (CG5, CG7, CB3, CB4).
MD2 - Practical activities. Learning by solving problems, exercises and case studies through which competences on the different aspects of the subject are acquired (CE3, CB12, CT1, CT2).
MD3 - Transversal competences. Visits to companies, attendance to courses, conferences, round tables and other types of activities organised and/or proposed by the CAT of the Degree (CG5, CG7, CB3, CB4).
MD4 - Laboratory and/or computer lab work. Learning through activities developed individually or in small groups and carried out in laboratories and/or computer rooms (CG5, CG7, CB3, CB4, CT1, CT2, CE3, CE12).

EVALUATION

SE2 - Assessment of practical activities based on the preparation of assignments and/or oral presentations. This section of the evaluation will count for 60% of the final grade of the subject. (CG5, CG7, CB3, CB4, CT1, CT2, CE3, CE12).
SE3 - - Continuous assessment of each student, based on the participation and degree of involvement of the student in the teaching-learning process, taking into account regular attendance at the scheduled classroom activities and the resolution of questions and problems proposed periodically. This section of the evaluation will count for 40% of the final grade of the course and is not recoverable (CG5, CG7, CB3, CB4, CT1, CT2, CE3, CE12).

Particular considerations about the evaluation:
- There will NOT be an exam at the end of the course on theoretical and practical issues (SE1).
- The final grade of the course will be calculated as the weighted average of the 2 sections (SE2, SE3), and the difficulty and workload of the activities will be taken into consideration.
- The evaluation criteria are the same in both calls.
- There are no sections that require a minimum mark.

In any case, the evaluation system will be governed by the one established by the Regulation of Evaluation and Grading of the University of Valencia for Degrees and Masters: (https://webges.uv.es/uvtaeweb/muestrainformacionedictopublicofrontaction.do?accion=inicio&idedictoseleccionado=5639).

Copying or plagiarism of any activity that is part of the evaluation will result in the impossibility of passing the course, and the student will then be subject to the appropriate disciplinary procedures indicated in the ACTION PROTOCOL FOR FRAUDULENT PRACTICES AT THE UNIVERSITY OF VALENCIA (ACGUV 123/2020).

REFERENCES

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- Fundamentos de Física para Profesionales de la Salud. Capitulos 9, 10 y 11 Alberto Nájera López; Enrique Arribas Garde; Juan de Dios Navarro López; Lydia Jiménez Díaz Editado por Elsevier. Publicado el: 09/2014