GHENT UNIVERSITY

Course Specifications

Valid in the academic year 2024-2025

Data Analytics in Healthcare and Connected Care (E027770)

Course size *(nominal values; actual values may depend on programme)*

Credits 6.0 **Study time 180 h**

Course offerings and teaching methods in academic year 2024-2025

A (semester 2)	English	Gent	practical lecture
B (semester 2)	Dutch	Gent	

Lecturers in academic year 2024-2025

Ongenae, Femke	TWO5	staff member
Van Hoecke, Sofie	TWO6	lecturer-in-charge
De Turck, Filip	TWO5	co-lecturer

Offered in the following programmes in 2024-2025	**crdts**	**offering**
Master of Science in Biomedical Engineering	6	B
Master of Science in Biomedical Engineering	6	A

Teaching languages

English, Dutch

Keywords

Data analytics, machine learning, eHealth, big data, medical devices

Position of the course

The purpose of this course is to give students a detailed overview of how data from medical devices, wearables and databases can be acquired, processed and visualized, in order to provide insights for medical doctors, nurses and paramedics. Focus will be on distributed applications that combine software technologies, network technologies, semantic technologies and/or machine learning for usage in hospitals, nursing homes, but also in residential context for healthy living applications.

The students will learn the technologies during the lectures and will gain hands-on experience during the specific lab sessions using real-life data sets.

Contents

The following topics will be covered during the lectures and will be available in the course notes:

- From medical device/sensor/wearable to data:
  - Network, cloud and software technologies to connect to medical devices, wearables and acquire data from these devices
- Data extraction, databases and management of datasets
  - From SQL to NoSQL
- Healthcare knowledge management
  - Semantics / reasoning / ...
- Introduction to machine learning and data mining technologies
  - Visualization of medical datasets
  - Data cleaning
  - Supervised (classification, regression) vs unsupervised (clustering) data mining
  - Working with different types of data (time series, text, images, video)
  - Working with different machine learning techniques (basic and state-of-the-

art techniques)

Initial competences

Basic programming skills in Python, and basic knowledge of algorithms and data structures (e.g. as acquired in the bachelor courses 'Discrete Mathematics' and 'Informatics').
Core courses from the Biomedical Engineering program, such as Signal Processing and Analysis of Systems and Signals.

Final competences

1 Understand network technologies and protocols tailored to connect medical devices, wearables and databases
2 Being familiar with the basic concepts of database systems and databases and understanding how database systems work
3 Having a comprehensive knowledge about the machine learning process where data is transformed into information and knowledge
4 Understanding the details of and choice between supervised and unsupervised systems
5 Interpreting and visualizing the results of a machine learning process or the content of medical datasets
6 Having a comprehensive knowledge of Python for data analytics purposes
7 Being able to select, for a given healthcare analytics problem, the most appropriate method to achieve the defined goals
8 Being able to construct datasets by querying APIs

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Lecture, Practical

Study material

Type: Slides

Name: Slides on Ufora
Indicative price: Free or paid by faculty
Optional: no
Language : English
Number of Slides : 2000
Oldest Usable Edition : Yearly update of slides
Available on Ufora : Yes
Online Available : Yes
Available in the Library : No
Available through Student Association : No

References

References to relevant hand books will be provided to the students

Course content-related study coaching

- Lab sessions are supervised by teaching assistants
- Additional information available via Ufora

Assessment moments

end-of-term and continuous assessment

Examination methods in case of periodic assessment during the first examination period

Written assessment

Examination methods in case of periodic assessment during the second examination period

Written assessment

Examination methods in case of permanent assessment

Skills test, Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible in modified form

Extra information on the examination methods

- During examination period: written closed-book exam; written open-book exam.
- During semester: graded practicals/lab sessions, participation to each lab is required.

Calculation of the examination mark

- 75% exam
- 25% lab sessions/practicals

In order to pass the course, the student must obtain at least 8/20 for the PE (exam) and the NPE (handing in all lab session and lab practical reports, with a minimum average score of 8/20). If this condition is not met, the final score will deviate from the calculated score if 10 or more was obtained and the student will receive a score of 9/20.