UCLouvain

linfo2381

2023

Health Informatics

5.00 credits	30.0 h + 30.0 h	Q2

Teacher(s)	Jodogne Sébastien ;
Language :	English > French-friendly
Place of the course	Louvain-la-Neuve
Prerequisites	Students are expected to master the following skills: • Develop in the Python language. • Implement and test a solution in the form of a software prototype. • Demonstrate a good understanding of the basic concepts and the methodology of programming. • Analyze a problem to provide an IT solution and implement it in a high-level programming language. These skills are for instance covered in courses LEPL1401, LEPL1402, LINFO1101, LSINC1101 and LSINC1402. Database and network programming skills (as covered for instance in LEPL1509 and LSINC1509) are also useful but will be briefly reviewed in LINFO2381.
Main themes	• Medical information systems and associated medical devices. • International medical interoperability standards and clinical nomenclatures. • Document-oriented databases. • Health IT networks and associated network protocols. • Management and analysis of patient data, including through machine learning.
Learning outcomes	**At the end of this learning unit, the student is able to :** With respect to the AA referring system defined for the “Master in computer science and engineering” (INFO2M), the course contributes to the development, mastery, and assessment of the following skills: • AA1.1, AA1.2, AA1.3 • AA2.3, AA2.4 • AA5.2, AA5.3, AA5.4, AA5.5 • AA6.1, AA6.3, AA6.4 With respect to the AA referring system defined for the “Master in computer science” (SINF2M), the course contributes to the development, mastery, and assessment of the following skills: • AA1 • AA2.3, AA2.4 • AA5.2, AA5.3, AA5.4, AA5.5 • AA6.1, AA6.3, AA6.4 With respect to the AA referring system defined for the “Master in biomedical engineering” (GBIO2M), the course contributes to the development, mastery, and assessment of the following skills: • AA1.1, AA1.2 • AA2.3, AA2.4 • AA5.2, AA5.3, AA5.4, AA5.5 • AA6.1, AA6.3, AA6.4 With respect to the AA referring system defined for the “Master in data science engineering” (DATE2M), the course contributes to the development, mastery, and assessment of the following skills: • AA1.4, AA1.6 • AA2.3, AA2.4 • AA5.2, AA5.3, AA5.4, AA5.5 • AA6.1, AA6.3, AA6.4 With respect to the AA referring system defined for the “Master in data science: Information technology” (DATI2M), the course contributes to the development, mastery, and assessment of the following skills: • AA1.4, AA1.6 • AA2.3, AA2.4 • AA5.2, AA5.3, AA5.4, AA5.5 • AA6.1, AA6.3, AA6.4

	Students completing successfully this course should be able to: • Understand the digital environment used in the global healthcare context. • Design and develop software that is interoperable with existing medical information systems, notably for the secure analysis of patient data in compliance with existing legislation. • Identify paradigms for developing new IT applications for clinical departments, medical institutions, and healthcare networks. Students will have developed skills and operational methodology. They will notably have developed their ability to: • Integrate a multidisciplinary approach between computer science and medicine, using wisely the terminology, standards, tools, and existing methods. • Manage the time available to complete projects of medium size.
Evaluation methods	• First session: • Written examination (closed-book), worth 70% of the final grade. • Projects are worth 30% of the final grade. • Second session: • Oral examination, worth 70% of the final grade. • Projects are worth 30% of the final grade. The projects cannot be implemented again in second session. The project grades are fixed at the end of the semester and included as such in the global score for the second session. Continuous assessment is based on assignments/homeworks, with a single overall mark awarded at the end of the last assignment/homework. Failure to comply with the methodological instructions communicated by the teacher, particularly with regard to the use of online resources or collaboration between students, in an assignment/homework will result in an overall mark of 0 for the continuous assessment. In particular, the use of generative AI tools and any collaboration is strictly prohibited during the assignments/homeworks. The use of public resources intended for programmers (e.g., stackoverflow.com) is permitted, provided that each (fragment of) code submitted by the students mentions all resources used. The distribution or exchange between students of (fragments of) code is not allowed by any means (GitHub, Facebook, Discord...), and this even after the deadline for submission of assignments/homeworks.
Teaching methods	• Lectures in auditorium. • Projects to be carried out in groups of maximum 2 students to implement, and possibly to adapt, technologies and algorithms covered in the course lectures. By default, projects must be carried out in Python, but students wishing to do so can use Java. • Question-and-answer sessions with a teaching assistant during the slots reserved for practical sessions. • This teaching unit addresses transition-related issues through discussions on the risks, problems, and opportunities associated with the deployment of IT in the clinical practice.
Content	• Medical information systems and associated medical devices. • International medical interoperability standards (HL7, FHIR, DICOM...) and clinical nomenclatures (SNOMED-CT, LOIC...). • Document-oriented databases (NoSQL). • Health IT networks and associated network protocols. • Management and analysis of patient data, including through machine learning. • Historical perspective on the development of medical informatics, as well as on the socio-economic impact of the introduction of these technologies.
Inline resources	Moodle UCLouvain -> https://moodle.uclouvain.be/course/view.php?id=8597
Faculty or entity in charge	INFO

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Biomedical Engineering	GBIO2M	5		
Master [120] in Computer Science and Engineering	INFO2M	5		
Master [120] in Computer Science	SINF2M	5		
Master [120] in Data Science Engineering	DATE2M	5		
Master [120] in Data Science: Information Technology	DATI2M	5		